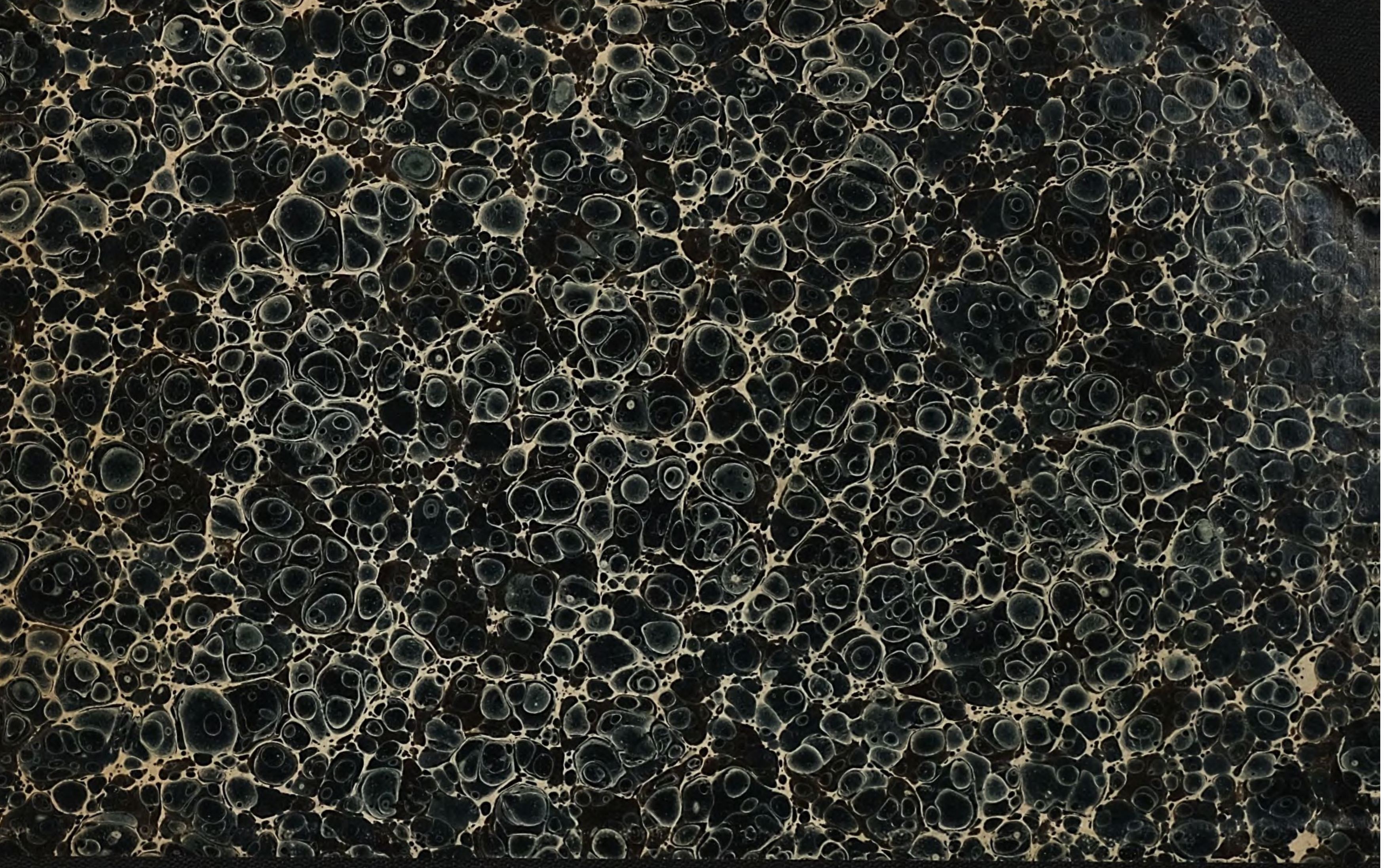


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THE

ARGENTINE REPUBLIC

WRITTEN IN GERMAN

BY

RICHARD NAPP

ASSISTED BY SEVERAL FELLOW-WRITERS

FOR THE

CENTRAL ARGENTINE COMMISSION

ON THE

CENTENARY EXHIBITION AT PHILADELPHIA

(With several Maps)



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CHAPTER I.

INTRODUCTION.

It is sufficient to glance at the map to understand the importance of the Plata, that majestic river, whose mouth, 2000 miles to the South of that of the Amazon, may be considered as the entrance door of South America.

Even its confluents are water-courses of the first order; the Uruguay, which comes from the mountains of Brazil, is navigable hundred of leagues; the Paraná, yet more imposing, swallows up the Paraguay, its rival in extent and importance. The system of the tributary rivers of the Plata, extends even to the heart of South America; it commences in the Cordillera or Andes, by a thousand channels which form a vivifying net-work that could be compared to the veins of the human body; it waters the immense plains which are spred at the foot of these mountains, and after having fertilized them it carries their products to the littoral, where they acquire their real value in contact with the commerce of the world.

Ere long the treasures of Bolivia — the El Dorado of the gold seekers so rich it is in minerals — will cease to be transported on mule-back over snow-capped summits to the coast of the Pacific in search of a vessel to convey them to Europe, by the long and perilous route of Cape Horn.

Thanks to steam, the precious metals will descend the Bermejo, to the river Paraguay, and thence by the Paraná to Buenos-Aires which will become the general depôt for the merchandise and the minerals of Chile and Peru.

The Argentine Government, not content with these aquatic roads, as yet too little frequented desires—also that its iron ways should reach the frontiers of the Republic, leap the Andes, and joining

the Chilean rail-roads place Valparaiso, the most important city of the West Coast, in communication with the ports of the Plata.

Contracts have been signed to this effect with railway contractors, and these have already finished the plans and presented them to the approbation of the authorities. It may, therefore, be said that before five or six years the transandine interoceanic railway, will be opened to the public.

For a long time, perhaps, merchandise in bulk will continue to take the sea-route by the Straits of Magellan, but passengers and valuable goods leaving Chile and Peru, will certainly be embarked at Buenos Aires.

The Argentine Republic is yet little known, its natural productions are little worked, and its immense plains have remained, until now, without culture. This state of things is due only to its past political history.

The regions known at present under the name of "territories of the Plata," that is to say, the Uruguayan, Paraguayan and Argentine Republics, formerly composed the Spanish vice-royalty of Buenos Aires. During three centuries after their discovery, they were governed by the Spanish colonial regime, which consisted in isolating them from the rest of the world, for the purpose of speculating upon them to the greatest possible advantage of the metropolis.

The inhabitants of this country could not enter into commercial relations either with the foreigner or with the other colonies. The Spanish Government made a monopoly of this commerce against the traders, and even interdicted all exportation during a certain period.

The administrative despotism also designated the products which each province ought to cultivate, or *exploit;* and this designation was made without any consideration of the nature of the soil or of climateric condition. Such a province could not plant tobacco, even for the use of its own inhabitants, to another was interdicted the cultivation of the sugar cane; a third could not plant cotton, or a fourth had no right to plant coffee.

Such a system could only fetter the progress of the colonies. Towards the end of the 18th century, Spain imagined that she had entered upon a more liberal course, by permitting the vice-royalty of Buenos-Aires, which had been formed first, to freight each year two vessels of 100 tons each, with the already numerous products of herds, and to send them to the mother country.

The contraband, then considerable, was principally exercised by the English and Portuguese, who generally trafficked only with articles of small volume and of great value, inasmuch as the exportation of hides and bulky products, was impossible.

Such was the truthful situation of the Plata in 1810, when the revolution burst forth.

The greatest commercial liberty was at once proclaimed, but the decrees which granted it remained a long time without effect, because Spain guarded the mouth of the Plata with her war vessels, which were sustained by the fortress of Monte-Video.

When the war of independence had finished, and Spain had renounced her dominion in South America, civil wars broke out everywhere, and ruined the country already greatly impoverished by a struggle of fifteen years' duration. These continual troubles brought the dictatorship of Rosas, which commenced in 1835.

The Dictator established himself in Buenos-Aires, which was then the only port of the Republic. He adopted a policy of brutal americanism, or rather of an exaggerated nationalism, which brought on conflicts with European nations.

Buenos-Aires was blockaded during several years. England and France knew too little of the Argentines, to imagine that the blockade strengthened the power of Rosas, by increasing the patriotism of a people who were naturally so much the more jealous of their independence inasmuch, as they had sacrificed to it their wealth, their material tranquillity, and the blood of their best citizens.

Thanks to the unskillful policy of the two first maritime powers of Europe, Rosas had an excellent reason for concentrating all the forces of the country at Buenos-Aires — the principal point of attack—thus exhausting the Provinces of men, and of money.

The centralization thus brought about under the pretext of a national danger, continued when that had passed, and lasted even to the end of the Dictatorship, which occurred in February 1852.

After the fall of Rosas — who sought refuge in England, where he met with the best reception from the authorities — the country was able to breathe freely.

All restrictions to commercial liberty were suppressed, and the freedom of the navigation of all rivers for all flags, was decreed on the 25th of August, 1852, by General Urquiza, the provisionary Director of the Republic, and ratified by law the 1st of October following.

Therefore, the Argentine Republic only commenced its development in 1853, which however, has been above all accelerated since 1862, the epoch in which the country was definitively constituted.

Considering the progress accomplished in this short period of thirteen years, we are obliged to acknowledge that in no part of the world, has the progressive march of the people been so rapid.

This Republic has a superficial extent of 4,195,000 square kilometres, and a population about 2,400,000 in number. Comprised between 56° and 20° S. Latitude, and 53° 30 — 71° 30' W.

Longitude — meridian of Greenwich — it belongs to the temperate zone, although tropical products are cultivated with success in the Northern Provinces, where cotton, coffee, sugar, etc., may be abundantly produced of an excellent quality.

Paraguay — a tropical region surpassing Brazil and even the Indies in fertility — belongs to the water-shed of the Plata, and is obliged from its geographical position, to send its products to Buenos-Aires. The commercial importance of that market cannot be ignored, although a long war has for the present, greatly diminished its productions.

The fertility of Argentine soil is remarkable, and this country may already be classified among the great producers of wheat, although the agricultural population is not more than 20,000 persons, including women and children.

Formerly it was supposed that the *Pampas*—vast Argentine plains where trees are absolutely wanting—were unfitted for agriculture, and condemned to remain always in the state of prairies. But practice has contradicted these erroneous ideas. Some thirty communities of immigrants which the Republic already possesses, are occupied with agriculture, and are exclusively established in the Pampa, obtaining excellent results.

Doubtless Argentine flour will compete with that of the United States before long, in the markets of Eastern South America, and it will help to provision Europe. Tobacco, oil, flax, etc., will soon figure amongst our articles of exportation, and the increase of the agricultural population will cause the cultivation of the vine, of cotton, of sugar-cane, the raising of the silk-worm, and the preparations of several dye-stuffs which abound in this country. A little later on, the inmense forests which the Republic possesses will furnish precious wood for exportation. This assertion will astonish those who only know the Province of Buenos-Aires; but it is far from being the most favored by nature, and it might be said that she has treated it as a step-mother, were its natural products to be compared to those of its sisters.

At the National Exposition of Córdoba in 1871, hundreds of specimens of valuable woods could be seen: and a collection sent by the Agricultural Department, figured in the International Exhibition of Vienna. It was composed of a sample of each of the woods of a single Province—Corrientes—and yet it obtained a diploma of honor.

But whatever may be the extraordinary increase of our agriculture, the mines will soon surpass it. In this respect also, Buenos-Aires cannot hold a parallel with the other Provinces. All the littoral is a flat country, whilst the interior of the Republic is covered with hills and mountains, seamed by delicious valleys. These mountains — of which some are covered with eternal snow — enclose mineral wealth of all kinds.

The want of means of communication, principally by rail, has hindered the explotation of these treasures as yet, but this obstacle diminishes day by day, as the rail penetrates the Interior, for the mines become accessible, and machinery can be transported to work them. Neither the spirit of enterprise nor capital, will be wanting to these sources of activity and wealth, which the Argentine Republic for the first time, offers to the world.

If the future prosperity of our country cannot be doubted, and appears to us under a smiling aspect, the present also, is not less flattering. If the working of the mines, the progress of agriculture and manufactures as yet have only had a relative importance, there is one branch of commerce which alone is sufficient to secure the prosperity of the country: it is our cattle, which are now the principal base of our exportations, and will long continue to furnish to the old world enormous quantities of raw material. Hides and wool, tallow, hair, salt-meat, bones, etc., are articles constantly augmenting in value, due to the increase of the population of the world. And the excess of this population will also be of advantage to our country, whose immense territory will offer a field of activity to immigration for a couple of centuries at least, without feeling any of the inconveniences of too dense a community.

Although their exports serve as a measure of the wealth and activity of a people, it is proper also to speak of imports. Our country introduces from abroad such a considerable quantity of merchandize that it appears to be out of proportion to its population. The imports surpass in value the exports, and a relative scarcity of money results, this latter constantly leaving the country to pay the excess. Over and above the loans contracted by the State, the capital of the great enterprises, banks, railways, etc., is brought from abroad, so that its interest represents considerable sums which are constantly sent away from us. A high rate of interest or of discount, is the forced consequence of this situation; but the general prosperity and development of the country do not suffer. The profits which are realized, and the price of labor, are raised in proportion, and a general welfare explains the great consumption of imported articles.

Since its origin, that is to say since its separation from Spain, the Argentine Republic is organized as a Confederation. The Confederated States — improperly called Provinces — are: Buenos-Aires, whose capital has the same name and is the residence of the National Government; Entre-Rios, capital Concepcion del Uruguay; Corrientes, Santa-Fé, San Luis, Mendoza, San Juan, Catamarca, Santiago del Estero, Rioja, Tucuman, Salta and Jujui, each with a capital of the same name.

The province of Buenos-Aires is the most populous, and to-

gether with Santa-Fé, Entre-Rios and Corrientes, forms what is called the littoral — river shore —,a region where grazing or the breeding of cattle, is the principal industry. The other provinces possess numerous herds also, but their pastures are less abundant and do not constitute the chief industry.

The Argentine Constitution is certainly one of the most liberal in the world, without excepting that of the United States, which has served as its model. It might even be said that it is too liberal, and that it does not give sufficient power to the Magistrates to maintain order on all occasions. The legislators who were not always practical — although well-intentioned — men, on release from the Spanish domination, granted to the people an unlimited liberty, utterly forgetting that they founded a republic without any republicans.

It is always a dangerous thing for a people to go from one extreme to the other, without a period of transition. The proofs of this truth are found each day in the old continent. Here the change was more brusk than any where else. The people had been kept in absolute ignorance, they knew neither how to write nor to read; they had remained isolated from the whole world, and had been bred in systematic hatred to the foreigner. All of a sudden they decree one of the most liberal Constitutions, without having the first notion of liberty, of law, of civic duties, or without possessing any laws appropriate to their new condition. They passed without any transition from a state of passive obedience, to that of an armed struggle against their oppressors, and during several years had no other occupation save that ofsecuring their independence.

There is nothing astonishing therefore, in the fact that the Argentine people who had shown their heroism during the war, should have remained enfeoffed to their leaders, and should have consented to serve the ambition of their officers who had become feudal chieftains.

The simple fact that the Republic has been able to resist these troubles which lasted more than a generation, ought to be considered as a proof of extraordinary vitality. Not only has it survived its miseries, but it was reestablished so quickly that it is at present the most powerful, as it is the most advanced of the former Spanish colonies.

We possess to-day 1950 kilometres of railway in use: 340 kilometres in construction; 4700 already located, and 1100 kilometres granted. Our telegraphic system extends over the whole country, and places us in contact with Europe and the West-coast of South America. 22 ocean-steamers arrive monthly from different ports of Europe, and thousands of immigrants come from all points of the old continent, to establish themselves upon our territory, where

they find remunerative labor. If immigration at the beginning of this year has somewhat diminished, it must be attributed to exceptional circumstances, which have passed away and will probably not return.

The Argentine Republic is in full development, a great future is reserved to it, but it claims the assistance of all the peoples, the sooner to realize its great destinies. Above all, it requires to augment its population ten-fold as soon as possible, to procure the indispensable power of labor. Not only does it call for this which is wanting, but also for specialists and learned men capable of impressing an intelligent direction to both foreign and native energy, to which it offers such a vast theater.

There is no country more favored by Nature than the Argentine Republic, as we propose to show in the following pages. The proofs abound, but we have neither the time nor the space to give them all; we will however, endeavour to choose those which are of a nature to carry conviction to our readers.

CHAPTER II.

HISTORICAL SKETCH.

Not content with the sovereignity of a Continent, Spain envied the wealth which her rival Portugal, procured from the Moluccas Islands, and endeavoured to take those colonies situated in the Malayan Archipelago. For this purpose she sought a communication between the two Oceans, and confiding this important enterprise to Juan Diaz de Solis, the ablest sailor of his time, gave him the command of two vessels. Solis sailed from the port of Lepe on the 8th of October, 1515, and steering towards the Brazilian coast, he arrived at the mouth of the River Plata, up which he went as far as the Island of Martin Garcia, thus named after his second officer. On debarking upon the oriental shore, Solis, with some of his companions, fell into an ambush of some natives of the Charrua tribe, who killed him. Being deprived of their commander, the sailors would not undertake an examination of the newly-discovered country, but turned their prows homeward. The lamentable end of this first expedition, paralized the energies of the Spaniards, until the conquests of Portugal in South America exited again their ambition. A new expedition was then equipped to counteract the Portuguese, who, under Cabral, having discovered Brazil, in less than fifteen years had extended their sovereignty over all South America. The expedition was confided to Diego Garcia, who sailed from Coruña about the middle of August, 1526, almost at the same time in which the Venetian, Sebastian Gaboto, had undertaken the task of seeking for a communication between the two Oceans. The want of provisions and a mutiny on board, prevented the latter to fulfil his purpose, and thus he entered the River of *Solis* — now the River Plata—and arrived, more through favourable winds and

weather than any foregone design, at the Island of San Gabriel, where he cast anchor. A small armed party which debarked for the purpose of examining the shores of the Uruguay, was attacked and killed by the indigenes, so that GABOTO found himself obliged, instead of ascending the Uruguay, to sail for the Paraná. Up this river he went as far as Carcarañal, where he founded the fortress of SANTO ESPIRITU in 32°25′12″ S. Lat., the first European establishment in the territory of La Plata. From thence, he made several voyages in the interior, which took him to the confluence of the rivers Paraná and Paraguay, and occasioned various encounters with the warlike natives. The passion for the precious metals so generalized in the discoverers of that time, and to which the world owes so much, had also excited GABOTO to these perilous voyages. His pacific or warlike relations with the Indians had enabled him to fix his attention upon their relative wealth in silver trinkets and utensils, and he was not long ignorant of the fact, that they had procured these articles in barter from tribes which lived farther in the interior. He was, therefore, of the opinion that by following up the river, he ought to reach the country of the precious metal. Nevertheless, GABOTO never gained his object, although to this idea the river owes its name of La Plata.

Whilst GABOTO examined and studied at his pleasure these countries discovered by chance, the expedition sent for this special purpose and commanded by DIEGO GARCIA, arrived at the mouth of the River Plata. "As was the custom among the conquistadores," serious quarrels soon took place between the two commanders, and GARCIA was obliged to leave and return to Spain. GABOTO, fearing—probably not without reason—that the decision of the Madrid Government would be unfavourable to him if he left the opportunity to his rival, soon sailed also for his own country. He left a strong garrison in the fortress of Santo Espíritu, which probably would have been sufficient on account of the friendly relations existing with the natives, to secure the first of the European establishments, if a passion of a cacique of a tribe of Timbú Indians, for the wife of one of the garrison officers, had not caused the ruin of the fortress. Those of the garrison who escaped from the unforeseen attack and burning of the establishment, fled to the port of San Vicente on the Brazilian coast.

From the reports upon this extensive country, the Spanish Government recognised that the occasion was propitious for joining a new jewel to the treasures of its colonies. Exaggerated stories of the wealth to be obtained there, also caused great excitement among the people, notwithstanding the news of the sad fate which befell the first establishment. There was no want of either means or men to equip a new expedition, and definitively annex

the territory of La Plata. Don PEDRO DE MENDOZA, a rich and distinguished Spaniard, made an arrangement with his Government, by virtue of which he equipped an expedition at his own expense, under condition that he should be named the Governor of all the countries already—or to be henceforward-discovered. The honor of having founded the city of Buenos-Aires, on the Western shore of the River Plata, belongs to him; he named it the *Santísima Trinidad*, whilst he called the port, Saint Mary of the Good-Airs, *Santa Maria de Buenos Aires*. MENDOZA debarked there in the beginning of the year 1535, and on the 2nd of February the foundation of the city took place. The task of maintaining, much less of extending—the young establishment in the midst of the warlike tribe of "Querandí" Indians which surrounded it, was by no means easy. Probably MENDOZA would have succeeded better, had he occupied a greater extent of land from the commencement, so that the colonists could have cultivated the grains necessary to their support: the extremely fertile soil even indicated this course. But the Governor shut up all his people in a small space insufficiently fortified, in such wise that when quarrels had arisen with the Indians, and they would no longer fournish provisions, the people had nothing to eat save the shortcommons which remained from their voyage; therefore, privations and misery soon commenced amongst them, and being besieged according to the report by 23,000 Querandís, without any hope of soon receiving any succour from beyond sea, MENDOZA was obliged to abandon his establishment against his will, and to flee to the fortress of the Carcarañal founded by GABOTO. Thence, he sent forth armed expeditions under the command of AYOLAS, and to this captain is due the discovery of the country called by the natives "Lambaré," at present the Republic of Paraguay; a discovery of the greatest importance for the definitive occupation of the territory of the Plata. Asuncion, the capital of Paraguay, was founded in 1537.

Soon MENDOZA worn out in body and mind, left for his own country, but died on the voyage, and the valiant AYOLAS succeeded him in the command of the Spaniards, where all those who had not accompanied AYOLAS during his unfortunate voyage in search of El Dorado, were comfortably installed and sufficiently prosperous. These colonists, named DOMINGO DE IRALA their Governor, by a happy election, because the new commander knew how to organise and secure with admirable talent, the duration of the new colony. Nevertheless, the Government of Madrid appointed as Governor, the valiant and prudent gentleman, NUÑEZ CABEZA DE VACA. He arrived at Asuncion after many dangers, on the 11th of March, 1542, and was wise enough to secure the good-will of IRALA, by naming him his second-in-command. Not-

withstanding this, CABEZA DE VACA could not sustain himself; the colonists revolted against him in 1544, made him prisoner and embarked him for Spain. By this event IRALA again became the commander, and the Government of Madrid confirmed him as such in 1555. The first Bishop of La Plata, PEDRO LA TORRE, was the bearer of the decree to this effect.

After the death of IRALA the Spanish colony suffered some time from anarchy, until his son-in-law, ORTIZ DE VERGARA, was named Governor; but when he demanded the confirmation of this election from the Viceroy of Peru, it was refused him, and ORTIZ DE ZÁRATE was named in his place, and received the confirmation of the Madrid Government.

About this time, JUAN DE GARAY arrived on our shores and founded the city of Santa-Fé, capital of the Province of that name, in July 1573, and later, on having become the successor of ZÁRATE, he re-established the abandoned colony of Buenos-Aires, on the 11th of June, 1580. GARAY is, consequently, the real founder of this flourishing and populous city. Two years later GARAY was assassinated during a trip to Santa-Fé, and VERA Y ARAGON, whom he had represented, was obliged to take the rains of Government himself. This, however, did not occur until 1587. In 1590, VERA Y ARAGON resigned the Government, one of his captains having previously founded a general head-quarters on the road to Asuncion, which, afterwards, became the city of Corrientes.

Whilst the Spaniards discovered and occupied in this manner the shores of navigable waters, several land expeditions started from Peru, and explored and peopled the interior of the Plata country. The cities of Santiago del Estero in 1553, Tucuman in 1565, Córdoba in 1573, Salta in 1582, Rioja in 1591, and Jujuy in 1592, originated in this manner; whilst the conquerors from Chile occupied the provinces called Cuyo, and founded the cities of San Juan, Mendoza, and San Luis, which—so far as regards their administration—belonged to Chile, until the establishment of the Viceroyalty of Buenos Aires. The increase and importance of the countries occupied in this manner, caused the Spanish Government to pay more attention to their administration. Thus, Paraguay was constituted as a colony proper in 1620, and Buenos-Aires,—by the name of Province of the River Plata—was placed under the Government of the Viceroy of Peru, still holding the separate administration of a Governor. The city of Buenos-Aires was made the residence of the Governor, and although in its early days, neither ambitions, intrigues, quarrels or external dangers were wanting, it increased not only in its population, but also in wealth. As late as July 1717, General BRUNO DE ZAVALA governed with vigor, although his rule was stormy; because he

had received the order to protect the Spanish colonists on the opposite side of the river—the present Republic of Uruguay—against the attacks of the Portuguese, as also to arrange the commerce and quarrels in Paraguay.

Having fulfilled these orders, he went to the colony of Santa-Fé, which was so sorely pressed by the Indians of the Chaco, that its inhabitants were frequently compelled to take refuge in their churches. Hardly had he the direction of affairs up there, when he learned that four Portuguese vessels had arrived in the port of Monte-Video. He soon equipped an expedition under his own immediate command, and marching to the menaced points, he operated with so much ability, that the enemy already disembarked, was obliged to flee to his vessels on the 22nd January, 1724.

Whilst ZAVALA was fighting external enemies, the internal quarrels of Paraguay had again beeome so dangerous, that a commissioner sent from Madrid with the special object of pacifying them, had been unable to succeed, and ZAVALA was again called upon to subdue the rebellious colony. During this time he also founded the city of Monte-Video.

ZAVALA died in 1735 and at once internal discord was renewed and the Portuguese also again showed more openly their ambitious designs. The Madrid Government thereupon sent out a prudent and wise Governor-General, named ZEBALLOS, who landed at Buenos-Aires in 1756 with 1000 well disciplined troops, and compelled the Portuguese in 1762, to abandon their establishment on the opposite side of the River, called Santo Sacramento, from whence they constantly incommoded the Spanish colonies. But the Portuguese immediately attempted to reconquer this important position, and demanded succor from England, then their ally, which was granted: yet the combined fleet of the two nations did not succeed in taking the fort from ZEBALLOS; on the contrary, it was obliged to withdraw with heavy loss, and the Spaniards took the remaining Portuguese forts.

The peace of Paris in 1763, gave back Santo Sacramento to the Portuguese, nevertheless a constant peace between these two rivals, was impossible; thus, the Spanish Government soon sent a new and formidable expedition to the regions of La Plata, under command of the same proved and intrepid General ZEBALLOS, who had returned to his country. The principal object of this expedition was the punishment of the Portuguese and the suppression thenceforward, of their cupidity for the Spanish possessions in the Plata. It consisted of 116 vessels and good soldiers, and having sailed from the port of Cadiz in November 1766, already in the following February, ZEBALLOS had taken all the forts of the Island Santa Catharina. On the 2nd of June, the colony of

Santo Sacramento, which had been already taken so many times, and again lost to Spain by stratagem, surrendered at discretion.

All this experience, at length, taught the Government of Madrid, that it was indispensable to reorganise the administration of its colonies in the River Plata, and therefore, it determined to create a Viceroyalty with Buenos-Aires as the capital. The decree is dated 8th of April, 1776, and the tried General ZEBALLOS was appointed the first Viceroy of the regions of the Plata. The Governments of Paraguay, Tucuman—until then belonging to Peru—Cuyo—heretofore appertaining to the Captaincy of Chile—and of the River Plata, were comprised in this Viceroyalty, thus including all those territories which at present form the Republics of Bolivia, Paraguay, Uruguay, and the Argentine Republic.

We have yet to mention here, that during the year 1767, the Jesuits were expelled from the territory of the Plata, the same as from all the other Spanish dominions. For this purpose, the Government sent out a special commissioner, FRANCISCO PAULA BUCARELLI, who surrounded the convent of the Jesuits at an early hour on the 3rd of July, and having made prisoners of all the inmates, he embarked them for Cadiz

The town of Carmen was the first durable establishment on the coast of Patagonia: it was founded under the Government of JUAN JOSUÉ DE VERTIZ—successor to ZEBALLOS—who was a Mexican by birth, and reigned from 1775 to 1784. This Viceroy took much care in general to extend his territory, which in size could be called an empire: above all, he favoured the development of Buenos-Aires, his capital.

The Marquis LORETO, succeded him, and in turn was replaced in 1789 by General NICOLAS DE ARREDONDO, who gave way to PEDRO MELO DE PORTUGAL, in 1795. When this latter died in 1797, Marshal OLEGUER FELIU took charge of the Government until 1799, when Marquis AVILÉS arrived as Viceroy. Hardly a year passed before he was replaced by Marshal DEL PINO Y ROSAS, whose Government is remarkable from the fact that the first newspaper in the Plata was then published. DEL PINO also became celebrated on account of his meritorious efforts to improve public instruction. He established a school of Medicine, and Academy of Design, and a school for teaching the French language, all of which had been hitherto interdicted.

After the death of DEL PINO, the Marquis of SOBREMONTE succeeded him, and under his Government the first occupation of Buenos-Aires by the English took place—July 27th, 1806. The Viceroy fled to the city of Córdoba where he had previously resided for some time, and abandoned Buenos-Aires to its fate. But a Frenchman, one Captain LINIERS, belonging to the Spanish garrison of the city, undertook the organisation of the inhabitants

capable of bearing arms, and set them in array against the conquerors.

After several impetuous and bloody battles, in which the creoles gave proof of their strength for the first time, the English were compelled to surrender at discretion, on the 12th of August of the same year. A second English army, composed of 10,000 soldiers, with wishes to revenge the former defeat disembarked near Buenos-Aires on the 1st of July, 1807, but it was so completely beaten, that it not only immediately reembarked, but also abandoned Monte-Video which had been previously occupied. The iuhabitants knew how to profit still more from their victory, and the Viceroy SOBREMONTE, who had abandoned the capital in the most cowardly manner, was declared dismissed from his position, and LINIERS, the valiant General in the battles against the English, was named his successor. But he was a Frenchman, and the Spaniards were, then, the greatest enemies of the Napoleonists, and inasmuch as the Spanish party—that is to say, the Spaniards born in Europe then predominated in Buenos-Aires, it succeeded in overturning the Government of LINIERS. General ELIO, Governor of Monte-Video and chief of the native Spaniards, was able to gain the "Junta" of Seville in favour of his opinions, and that Corporation named the Marshal BALTAZAR HIDALGO DE CISNEROS, as Viceroy of the Plata. He landed at Monte-Video in July, and made his entry to Buenos-Aires in August, 1809.

It would have been difficult to have found in all Spain a person less fit for this post, particularly at that time of actual difficulties. Short as the occupation of Buenos Aires by the English had been, it had planted the seeds of liberty in the hearts of the civilized portion of the inhabitants, and the severity of the new Viceroy soon caused them to sprout. After the war of Independence in the United States the desire of liberty had already been excited in many patriotic breasts, and the French revolution had not failed also to re-echo its powerful shock even in these isolated and distant regions, whilst the virility of the people proved by the war against the English, had strengthened their self-confidence as an antithesis to the state of putrefaction in which the royal administration was found.

Yet it could be doubted whether the durable and tried attachment of the colonists to the mother country, would as yet have entertained the idea of revolution, had some small privileges been granted to them. But instead of an attempt at reconciliation, a censor had been sent to them who in a short time made himself absolutely detested.

Then the news arrived on the 10th of May 1810, of the fall of the "Junta of Seville." Will the country remain faithful? The King had been dismissed, the Junta which replaced him, or at

least pretended to replace him, was dissolved, and consequently the authority of the Viceroy had *ipso facto* disappeared also.

A meeting of the "notables" was called, and it resolved on the 22nd May 1810, that the commission of the Viceroy was no longer valid, and that a governmental board should be formed and take charge of the administration. The Spanish party, however, triumphed, and succeeded in naming CISNEROS as the President of this board. The people was not, however, content with this arrangement, and forced the board to resign on the 24th May. The new board of the revolutionary party was composed of CORNELIO SAAVEDRA, President, JUAN JOSÉ CASTELLI, MANUEL BELGRANO, MIGUEL ASCUÉNAGA, MANUEL ALBERTI, DOMINGO MATEU, JUAN LARREA, JUAN JOSÉ PASSO, and MANUEL MORENO as Secretary, with a right to vote. This took place on the 25th May, the day which the Argentine people still annually celebrate as the anniversary of their political redemption.

This popular Committee commenced acting by a circular sent to all the Municipalities of the Vice-royalty, communicating these events and inviting them to join the revolution. Thereafter it began the organization of the National Guard, and established a public organ in the service of their cause, which soon became celebrated under the name of *La Gaceta de Buenos Aires.*

Meantime the Spanish party fixed its head-quarters at Monte-Video, and from thence, under the command of General ELIO, fought the patriots with much assiduity. The former Captain LINIERS who had retired to Córdoba, likewise had no sympathies for the revolution. He joined the Spaniards and assembled a small number of malcontents for the purpose of leading them against Buenos-Aires; but he was taken on the 6th August by a battalion sent by National Committee, and shot on the 26th of the same month. Notwithstanding the desperate efforts of the Spaniards, the revolution extended from day to day: the Commissioners sent by the National Committee were received every where with true enthusiasm, and every where the people prepared for a decisive war against the Spanish authority. Nevertheless, the efforts of their enemies were crowned with some success, and they were assisted by the machinations of the Princess CARLOTA, who, residing at Rio de Janeiro since the expulsion of the royal family from Lisbon, put forth her rights of inheritance to the Spanish Colonies. This pretention on her part would doubtless have caused grave difficulties, had not England intervened—excited thereto by self-interest--and cooperated in the independence of the Plata.

Nor did the province of Paraguay join the revolutionary party. The people there, had been too well instructed by the Jesuits — shortly before expelled, and they had no desires — says the historian FUNES — to exchange their comfortable servitude, for

a liberty which in the beginning had to exact many sacrifices from them.

General BELGRANO, afterwards so celebrated, was named chief of an expedition sent to this Province with orders to induce it to take part in the revolution. Nevertheless he met with no success, although shortly afterwards — in May 1811 — Paraguay proclaimed her independence of Spain, but would neither join, nor subject herself to the orders of Buenos-Aires: on the contrary she declared herself a separate nation. The Spanish party naturally learnt of this defeat with cries of joy. It was yet strong owing to the energy of its chief ELIO, and its possession of a city so well fortified as Monte-Video, whilst it also disposed of various war vessels which several times blockaded Buenos-Aires, and did it a great deal of harm. However the patriots were not intimidated, and almost performed impossibilities of abnegation and courage. Whilst they maintained a relatively large army in Buenos-Aires to protect it against ELIO, they also sent expeditions to High Peru — now Bolivia — and gained crowns of laurel in the battles of *Cotagaita* — 27th October, and *Suipacha* — 7th November 1810. Even when a year later, the "caudillos" — guerrilla leaders — mutinied, and plunged the country into that torrent of civil quarrels which has been so fatal to it, refusing to recognize — above all, General ARTIGAS and his partisans — the authority of the National Committee, it did not lose courage. It held the true opinion that the principal danger to the revolution was in Monte-Video, and it attempted therefore to conquer that city, without the desired success in the beginning; yet it did not defer taking those measures which were necessary in other parts of the country.

As soon as the news arrived in Buenos-Aires — June 20th 1811 — of the defeat by the army of the Viceroy of Peru, of the patriots under BALCARCE, at Huagui near the Desaguadero on the frontiers of Bolivia and Peru, the National Committee — or Junta — whose personel meantime had been changed, immediately dispatched a new army, which by order of General BELGRANO, without any direct permission of the Junta, proclaimed on the 18th February 1812, the "blue-white-blue" colors as the national flag.

BELGRANO'S work was not easy. He had to organize the resistance of the North, and prevent the entry of the Spaniards from Peru: the accomplishment of such a task required the presence of an ardent patriot and intrepid General like BELGRANO. He received much assistance from the *caudillo* GÜEMES, a very popular personage in his native province of Salta, who served the revolution with much enthusiasm. With this support BELGRANO was enabled on September 24th 1812, to encounter the royal army under General TRISTAN, near to Tucuman, with extraordinary success.

This victory of the army of the North, was soon followed by another at Cerrito gained by General RONDEAU, who commanded the patriots beseiging Monte-Video, and thus the cause of liberty prospered more and more. By the 20th of February 1813, BELGRANO had already reconquered so large a part of the territory lost by his predecessors, that on that day he was able to celebrate his solemn entry to the city of Salta, after a final victory over TRISTAN, who had encamped in this Province. This success strenghtened the patriots, and authorized an official declaration of the legality of the revolution against Spain. To this end elections were ordered and representatives of all the provinces of the former Viceroyalty met on the 1st Janubry 1813. This Congress adopted the national flag choosen by BELGRANO, and decreed the arms of the new nation; viz.: a Phrygian cap of liberty held by two clasped hands, and illumined by the sun. At the same time the children of slaves were declared free.

On the 5th February of this year, SAN MARTIN gained a victory at *San Lorenzo* on the Paraná, after which the affairs of the patriots for some time prospered no more in these regions. The 1st October General BELGRANO was defeated at Vilcapugio, and yet again at Ayouma on 14th November, which caused the loss of High Peru. At the same time the mother country began to pay more attention to events in the Plata, and after the expulsion of the French having more regular troops at her disposal, she sent a corps of 2000 soldiers to Monte-Video. The people, however, did not lose courage, but clearly saw that they must become better constituted in these times of danger, and to that end they nominated GERVASIO ANTONIO POSADAS Director General of the United Provinces of the Plata. The army chiefs were replaced, BELGRANO by SAN MARTIN, and ALVEAR took charge of the siege of Montevideo. The Director General immediately undertook to increase the power of the revolution by the organization of a fleet, which he placed under the command of Admiral BROWN, of glorious memory. This distinguished sailor manœuvred with so much ability that he completely destroyed the Spanish fleet in the combats of the 14th and 16th May. These naval victories greatly contributed to the occupation of Montevideo on the 20th June 1814, with which event the Spanish power on the Plata, perished forever.

The year 1815 did not commence very favorably for the patriots, and they endeavoured to arrange their difficulties by diplomacy. It appears in effect, that some principal personages were disposed to enter into negotiations, but these efforts gave no result. New preparations were then made for the continuation of the war, but inasmuch as the enemy was no longer to be found on the littoral of the country, they undertook to expel him from Peru his principal asylum. General SAN MARTIN therefore passed the

Andes with his intrepid army, and gained on the 12th February 1817 the great victory of Chacabuco; occupied Santiago, the residence of the Captain General of Chile; and by the battle of Maipú on the 5th April 1818, won the independence of Chile. But not content with this success, SAN MARTIN formed the plan of attacking the enemy with his faithful troops in their last stronghold. His expedition consisted of 18 vessels and 4000 men; it left Valparaiso on August 20th 1820, and the 13th of the following July already occupied Lima, the capital not only of Peru, but of all the Spanish territory in South America. Thus all Spanish South America owes its liberty to the ancestors of the present generation of Argentines. Great is the glory acquired by the patriots during their war of independence. A sparsely-peopled country, whose inhabitants had been systematically oppressed, and were unable from their isolation to take any part in the affairs of the world, not only conquered its own liberty, but also expelled the proud Spanish rule from all the possessions it had occupied for so many centuries, in these parts of South America. Yet not only was Spain with its disciplined army accustomed to war, opposed to the patriots, but the powerful reaction which followed the fall of NAPOLEON was transferred from the old continent to America, and considered the revolution against sacred absolutism — or Divine right — as a crime; and it was only due to the energetic opposition of England, that the intention of the "Holy Alliance" to send troops to the Plata as an assistance to Spain, was frustrated (*).

As already mentioned the executive power had been confided to POSADAS, who, however, soon withdrew from the difficult position. He was succeeded by General ALVEAR, a mutiny of whose troops soon overthrew him in April 1815. IGNACIO ALVAREZ was nominated his successor and during his Government the National Congress met at Tucuman in March 1816, and solemnly proclaimed on the 9th July following, the complete independence of the United

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(*) This is an entire mistake. The United States invited England to co-operate with her in recognizing the independence of Buenos-Aires as early as 1818. But England being engaged in playing a double game of deep subtilty with the "Holy Alliance," concerning these same colonies, gave no respectful attention to the invitation. The United States also refused the invitation of England to join in the Congresses of Laybach and Verona, which were specially called to devise means to aid Spain in reconquering the lost colonies; and foremost and unaided, and with the sympathies of the Monarchical world against her, recognized the independence of the Spanish American Colonies, in January 1822, by an almost unanimous vote of Congress. England *followed*, and the question was settled for ever. The course of the United States in this matter was guided by the celebrated statesmen MUNROE, J. Q. ADAMS, and H. CLAY. See WHEATHON's Inter. Law, 8th ed. pp. 47 *et seg. n.* and 167 *et seg: n.*
(Note by Translator).

Provinces of the Plata, and named General PUEYRREDON Director of the Confederation with greatly extended powers. A new Congress met in 1819 and made a Constitution for the country, which was never adopted by all the Provinces. PUEYRREDON resigned, and on June 10th 1819, JOSÉ RONDEAU was elected, who, however, was in no condition to pacify the civil war which had broken out during the government of his predecessors. At the commencement of 1830, the last "Director General" was overthrown; the Municipality of the city of Buenos-Aires seized the Government; the Confederation was declared dissolved, and each of its Provinces received liberty to organize itself as it pleased. Thus was anarchy officially proclaimed.

After the fall in the same year of some military chiefs who had siezed the power, Gen. MARTIN RODRIGUEZ was named Governor of Buenos-Aires, and he succeeded in establishing some little order in this chaos. He chose M. J. GARCIA, and BERNARDO RIVADAVIA — one of the most enlightened Argentines of his time — as his Ministers. This administration did a great deal of good by exchanging conventions of friendship and commerce, and entering into diplomatic relations with foreign nations. At the end of his term General LAS HERAS — 9th May 1824 — took charge of the Government, and called a Constituent Assembly of all the Provinces, which met at Buenos-Aires, December 16th, and elected BERNARDO RIVADAVIA President of the newly Confederated Republic on the 7th February 1825. This excellent Argentine, however, found no assistance in the Congress. No understanding could be come to on the form or the test of the Constitution, nor yet upon the place of residence for the National Government. Whilst RIVADAVIA desired a centralized Constitution — called here *unitarian*—and that the city of Buenos-Aires should be declared capital of the Republic, the majority of Congress held a different opinion, and this divergence caused the resignation of the President on the 5th July 1827.

After this event, the attempt to establish a Confederation which would include all the Provinces, was considered as defeated, and each Province went on its own way, whilst Buenos-Aires elected MANUEL DORREGO, the chief of the federal party, for its Governor. He was inaugurated on the 13th August 1827, and at once undertook to organize a new Confederation of the Provinces, opening relations to this end with the Government of Córdoba, the most important Province of the Interior. He succeeded in re-establishing repose in the Interior, and was instrumental in preserving a general peace, even beyond the limits of his young country.

The Emperor of Brazil did not wish to acknowledge the rights of the United Provinces over the Cisplatine province, or Banda Oriental. He wished to annex it to his empire, and declared war

to the Argentine Republic on the 10th December 1826. An army was soon organized by the latter, under the command of General ALVEAR, which on the 20th February 1827, gained a complete victory over the Brazilian forces — twice their number — at the plains of Ituzaingó, in the Brazilian province of Rio Grande do Sul.

The navy of the Argentines also triumphed on several occasions, so that when England offered her intervention, Brazil renounced all claim to the territory of Uruguay by the convention of 27th August 1828, and the two parties agreed to recognize and to maintain the neutrality and independence of that country. DORREGO however, had but few sympathies in the army, and a short time after his return from Brazil, the soldiers under LAVALLE rebelled and forced him to fly to the country on the 1st December of the same year. There he found aid from the Commander General of the country districts, JUAN MANUEL ROSAS, and formed a small battalion with the intention of marching on the city of Buenos-Aires. But LAVALLE triumphed, took him prisoner, and shot him without trial on the 13th December. When too late LAVALLE repented his precipitation, because DORREGO — an estimable man — was the chief of the federal party which considered his death to be an abominable crime, and resolved to treat the Unitarians in the same manner.

Not only did the whole interior of the province of Buenos-Aires rise against LAVALLE, under the direction of ROSAS, but also a large part of other Provinces considered this event as a declaration of war, and the National Congress, then assembled at Santa-Fé, declared LAVALLE'S government illegal. The two parties fought with real fury, but in 1829 after an interview between ROSAS and LAVALLE, a temporary reconciliation was effected. LAVALLE proved that he had not followed the counsels of ambition when he expelled DORREGO, but that on the contrary he had no other intention than the realization of the unitarian principles of RIVADAVIA, of whom he was an enthusiastic partizan.

An expedition under the command of General JOSÉ MARIA PAZ to the interior Provinces to persuade them to join the Unitarian party, is a proof of the purity of his designs. Although PAZ sometimes triumphed in the beginning, he was finally defeated and taken prisoner by the federalists.

The legislature of Buenos-Aires, which had been convoked on account of the reconciliation between LAVALLE and ROSAS, elected the latter as Governor of the Province, on December 6th, 1829, and accorded to him extraordinary powers. Not much good was to be expected of this man, but the worst fears of the wisest citizens were far surpassed by the tyrant, who has forever written his name in bloody characters upon the historical page of his country. Yet during this the first period of his government he

did not appear in his true nature, and at its conclusion he refused a re-election and retired to the country. General JUAN R. BALCARCE was then — 17th December, 1832 — named Governor, but could only maintain himself some eleven months: VIAMONT succeeded him, also for a short time only.

Now the moment had come for ROSAS. He accepted the almost unlimited Dictatorship which was offered to him on the 7th March 1835, and reigned in a horrible manner, like a mad-man until his fall. Several times the attempt was made to deliver Buenos-Aires from his terrible yoke, and above all the devoted and valiant efforts of General LAVALLE deserve to be mentioned; but all was in vain, ROSAS remained unshaken. Finally, General JUSTO JOSÉ DE URQUIZA, Governor of the province of Entre-Rios, in alliance with the province of Corrientes and the Empire of Brazil, rose against the Dictator. He first delivered the Republic of Uruguay, and the city of Monte-Video— the asylum of the adversaries of ROSAS — from the army which besieged it, and thereafter passing the great river Paraná, with a relatively large army, he completely defeated ROSAS at Monte-Caseros, near Buenos-Aires, on the 3rd February, 1852. During the same day, ROSAS sought and received, the protection of an English war-vessel which was in the road of Buenos-Aires, in which he went to England, where he still resides.

Meantime URQUIZA took charge of the Government of the United Provinces, under the title of "Provisional Director," and called a general meeting of the Governors at San Nicolás, a frontier village on the North of the province of Buenos-Aires. This assemblage confirmed him in his temporary power, and called a National Congress which met at Santa-Fé and made a National Constitution under date of 25th May 1853. By virtue of this Constitntion the Congress met again the following year at Paraná, a city of Entre-Rios, which had been made the capital, and on the 5th May, elected General URQUIZA the first President of the Argentine Confederation. Previous to this URQUIZA had by treaty, granted the free navigation of the Argentine rivers to the flags of all nations.

The important province of Buenos-Aires, however, had taken no part in the deliberations of the Congress. Previously on the 11th September 1852, a revolution against URQUIZA, or rather against the Provincial Government in alliance with him, had taken place, and caused a temporary separation of the Province from the Republic. Several efforts to pacify the disputes utterly failed, and a battle took place at Cepeda in Santa-Fé, wherein URQUIZA, who commanded the provincial troops, was victorious, although his success led to no definite result. A short time after, the two armies met again at Pavon — near the site of the former battle —

and Buenos-Aires won the day. This secured the unity of the Republic of which the victorious General BARTOLOMÉ MITRE was elected President for six years from October, 1862. At the same time the National Government was transferred from Paraná to Buenos-Aires, and the latter was declared the temporary capital of the Nation.

The Republic owes much to the Government of MITRE, and it is probable that he would have done more good, if war had not broken out with Paraguay, in 1865. The Argentines took part in it as one of the three allied States against the Dictator of Paraguay, FRANCISCO SOLANO LOPEZ.

On the 12th October 1868, DOMINGO FAUSTINO SARMIENTO succeeded Gen. MITRE in the Presidency; advantageously known as an author, and assiduous protector of popular civilization, he did all he could for the intellectual and material advancement of the country. Above all, public instruction was the principal care of his administration, and he also dedicated much energy to the construction of railroads and telegraphs.

The 12th October 1874, Dr. NICOLÁS AVELLANEDA succeeded him in the Government. Yet young, and gifted with many talents, he endeavours with the best desires to heal the wounds made by the strong electoral struggle which accompanied his election, and which even caused an armed revolt. He continues the enterprises projected by his predecessors, to the end that the position — indicated by Providence for our Republic — of the first Nation of South America, may be secured to it.

CHAPTER III.

LIMITS, AREA, AND POPULATION.

THE Argentine Republic, as heir to the former Spanish Viceroyalty, had a right to all the territory which composed it. Nevertheless, she has recognized the independence of some parts of her inheritance, although among these, she has not always been able to agree upon the respective frontiers which divide them. Only the eastern limits are exactly defined, because the rivers Plata, Uruguay, and Paraguay, furnish such natural lines, it was not possible to ignore them.

As we have repeatedly said, the present Republics of Uruguay—formerly known as the Banda Oriental—of Paraguay, and of Bolivia, belonged to the Viceroyalty of the River Plata. Our Republic is separated from Uruguay and Brazil, by water, excepting a small portion on the North, between us and Brazil. Our frontiers with our other neighbors are not so precise, because they pretend to hold rights over territories which the Argentine Republic considers her legitimate property.

Latterly even, her rights over a considerable portion of Patagonia, have been disputed.

But Chile, from whence come these demands, has herself demonstrated the illigitimacy of her pretentions, because the districts which compose her jurisdiction are already defined, not only in her own Constitution, but also in Article I of the treaty with Spain, by which her independence was recognized by the latter, which, as is well known, was the primitive owner. In this article, all the territories which form this Republic are successively named, and no mention is made of any right to Patagonia on the part of Chile. Indeed it is conclusive on the "Patagonian question"

commenced by Chile, and therefore we reproduce it *verbatim et literatim*:—

"ART. I. Her Catholic Majesty, making use of the faculty "which belongs to her, by virtue of a decree of the "General Cortes of the Kingdom, dated the 4th of "December, 1836, recognizes the Republic of Chile "as a free, Sovereign, and independent Nation, "which is composed of the countries specified in its "Constitutional law, that is to say: all the territory "which extends from the desert of Atacama to "Cape Horn, and from the cordilleras of the Andes "to the Pacific Ocean, together with the Archi- "pelago of Chloé and the islands adjacent to the "coast of Chile. And Her Majesty renounces for "herself, as well as for her heirs and successors, all "pretentions to the Government, dominion, and "sovereignity of the said countries."

This treaty was subscribed on the 25th of April, 1844, by the Ministers of both nations, and ratified by the Chilean Government on July 1st, 1846. Moreover, the learned Don VICENTE QUESADA, Director of the Public Library of Buenos Aires, has just published a work under the title of *La Patagonia y las Tierras Australes*, wherein, from documents found in the Spanish Archives, he proves the unquestionable right of the Argentine Republic to Patagonia. Thus, without these two valuable documents of the Chilean Archives, not a single doubt can be entertained respecting the nullity of the claims of Chile, to Patagonia.

Inasmuch therefore, as the Southern limit of the Argentine Republic is fixed for ever, so also is the northern boundary determined—at least in its greater part—by international treaties. In the treaty of the triple alliance made in 1865 between the Argentine and Uruguayan Republics and Brazil, against FRANCISCO SOLANO LOPEZ, the Dictator of Paraguay, the northern boundary is placed at Bahia Negra, in 20° S. Lat. upon the right shores of the river Paraguay. Since then, an attempt has been made to weaken, and even deny, this fundamental condition of the alliance, although without effect, because the rights of the Argentine Republic have been officially recognized.

Negociations are also pending with Bolivia upon the question of limits; and it is probable that a satisfactory result for both countries will soon be obtained, although in this case, the question is more complicated than in that of Paraguay.

The present Republic of Bolivia is composed of the territories

under the jurisdiction of the formerly *Audiencia de Charcas*, which on its erection, were incorporated to the Viceroyalty of Buenos-Aires, having been separated from that of Peru. And, although it be true that the Congress of what is to-day the Argentine Republic, spontaneously recognized the secession, and independent Constitution of the four provinces of High Peru, in 1825,—a recognition which received a warm vote of thanks from the new Bolivian nation, thus acknowledging *ipso facto*, that the Argentines possessed indisputable rights over their territory—the province of Tarija was never included in this abdication; on the contrary, the country now known as the Argentine Republic, formally protested against the union of this Argentine Province to Bolivia, and the protest is still in vigor. Questions about limits also exist between Bolivia and Paraguay, the former believing that it has a title to the territory which the Argentine Republic at present reclaims from Paraguay. Thus, the approaching settlement between the Argentine and Bolivian Republics, must influence at the same time, the question of boundaries between Paraguay and ourselves.

Under these circumstances the construction of a new and exact map of the Argentine Republic, has met with many and grave difficulties, which are by no means completely overcome in that which we append to this book. Nevertheless, we ought to say here, in favor of this map, that we have taken advantage of all the data accessible to us, and it should, therefore, be considered the best map of the Argentine Republic as yet published. Consequently, we proceed to describe the boundaries we have made in it, as follows:

On the *East*, from Cape Horn — in 56° S. Lat. 67° Long. W. — the boundary extends along the Atlantic Ocean to the mouth of the River Plata, in 36° Lat. 56° 20' Long.; thence it goes up the Plata to the mouth of the Uruguay, by the mid-channel between the island of Martin-Garcia and the Uruguayan coast, and follows the direction of that river up to 25° 30' Lat. and 53° 30' Long. W., whence it trends to the North and N. W. along the rivers *Pepiri-Guazú*(*) and *San Antonio-Guazú*, to the mouth of the latter in the *Y-Guazú*, also called the *Rio Grande de Curitiba*. Thence the boundary runs to the West along mid channel of this river to its mouth in the river *Paraná*, and follows this down stream South and West, to its junction with the *Paraguay* river in 27° 20' Lat., and 58° 40' Long. Following up mid-channel of this latter river, to the North of the *Atajo*, or *Cerrito Island*, the boundary runs North to *Bahia-Negra*, situated in 20° S. Lat. and 58° W. Long. Green. Meridian.

(*) Guazú a Guaraní word which signifies *big*. *(Note by Translator)*

On the *North*, the boundary is drawn on our map by a straight line which runs S. W. from Bahia-Negra to the *Pilcomayo* river, in 22° Lat. and 61° 20' Long. and follows the same paralel of Latitude to 66° Long. We ought, nevertheless, to observe here, that the rights of the Argentine Republic extend on the North to the 20° Lat. in all questions with the Republic of Bolivia, although we have made in good faith, far more liberal offers to her than those traced in our map, which she has not as yet, answered.

On the *West*, our boundaries extend from the Southern point of Cape Horn, in 56° Lat., 67° Long. along the Western summit of the Cordilleras, to the 45° Lat. and 71° 30' Long., and thence to the N. W. to 26° 20' Lat. and 69° Long. from thence following a more determinate direction, towards the N. E., where the Northern limit is reached at 20° — or 22° — Lat. and 66° Long.

Therefore, the outposts of the Argentine Republic are:

On the	South,	56°	Lat.,	67°	Long.	W.	from Greenwich.
„	North,	20°	„	58°	„	„	„
„	West,	45°	„	71° 30'	„	„	„
„	East,	25° 30'	„	53° 30'	„	„	„

It appears to be superfluous to remark here, on account of the pending question on boundaries, that these data — exact as they are at present — ought not to be considered as final; and this applies equally to the map appended to this work.

We are obliged also to state, that the inter-provincial frontiers, or limits, such as they are traced on our map, require certain modifications, because, like the international boundaries, they are not yet determined by law. This book, and the map which accompanies it, cannot be charged with any intention of emiting an opinion respecting the pretentions of the different Provinces of the Argentine Republic as regards their limits, but, inasmuch as we have been obliged to delineate them more or less correctly, we have consulted the report of the special Committee appointed in the Senate to study this question, although it has not yet become a law of Congress; but it has served us as a basis to delineate — as far as possible in our map — both the boundaries with foreign countries, and those between the different provinces of the Republic. It may, therefore, very well happen, that in subsequent chapters of this book — above all, in the description of the Provinces — many data may be found, which do not correspond to the divisions found in our map, because it is probable, that those we have been able to obtain for this purpose, are taken from older sources.

We have only more or less well founded conjectures respecting the area of the Argentine Republic, inasmuch as the triangulation of the country has not yet been made; they differ very much from each other. Yet the census—taken in 1869, and which was

adopted by Congress—calculates that the whole extent of the Republic is equal to 4,195,000 squares kilometres. But Dr. H. BURMEISTER, who is the Chief of the Museum of Buenos Aires, has said in the first volume of his work, recently published under the title of *Physikalische Beschreibung der Argentinischen Republik*, that the area of this Republic is only 45,392 square geographical miles—at 15 geographical miles to the degree. This calculation made by so competent a person, more or less corresponds with the calculation of ARROWSMITH, who took for his basis the highly appreciated work of Mr. WOODBINE PARISH, formerly British Consul in Buenos-Aires. On this account we are compelled to believe this estimate. Nevertheless we ought to remark that Mr. BURMEISTER gives the Southern limit at 53° S. Lat., and the Northern limit at 22° S. Lat., whereas the Argentine Republic extends on the South, taking into view its position, right to Cape Horn, with all the islands of *Tierra del Fuego*, and not only as Mr. BURMEISTER says, to the Straits of Magellan; and on the North, its limits reach to 20° S. Lat.

Inasmuch as we cannot count the small number of wandering savages as inhabitants, it may be said that almost the half of this extensive territory has no population at all. This is demonstrated by the following table, taken from the already cited work of Dr. BURMEISTER:

NAMES OF THE PROVINCES	EXTENT IN SQUARE GEOGRAPHICAL LEAGUES (*)
Buenos-Aires	4300
Santa-Fé	1500
Entre-Rios	1400
Corrientes	1500
Córdoba	3225
San Luis	1075
Santiago del Estero	1720
Mendoza	1720
San Juan	1612
Rioja	1500
Catamarca	1940
Tucuman	750
Salta	2050
Jujui	1000
Total....	25,292
NATIONAL TERRITORY:	
Gran Chaco	5400
Misiones	700
Pampa	6000
Patagonia	8000
Total....	20,100

(*) 15 German geographical miles = 1°; 1 geographical mile = 7,420 kilometers.

The total area of the Argentine Republic is, therefore, some 45,392 squares German geographical miles.

The remainder of the Argentine territory is almost depopulated, although there is plenty of land to contain some hundreds of millions of industrious and active inhabitants.

According to our census of 1869 — to which we have already referred — the population of the Republic is 2,736,922; excluding the savages, it is as follows:

PROVINCES	INHABITANTS	AREA (acc. to Burmeister *) Square Geogr. Miles	DENSITY OF POPULATION (acc. to Burmeister *) Square Geogr. Miles	AREA (according to Census) Square Kilometers	DENSITY OF POPULATION (according to Census) Square Kilometers
Buenos-Aires	495,107	4300	115,14	215264	2,30
Santa-Fé	89,117	1500	59,41	117259	0,76
Entre-Rios	134,271	1400	95,91	113789	1,18
Corrientes.....	129,023	1500	86,00	125625	1,03
Córdoba.....	210,508	3225	65,27	217019	0,97
San Luis	53,294	1075	49,57	126890	0,42
Santiago del Estero.	132,898	1720	77,26	108933	1,22
Mendoza.....	65,413	1720	38,10	155745	0,42
San Juan.....	60,319	1612	37,42	103998	0,58
Rioja.....	48,746	1500	32,50	110786	0,44
Catamarca.....	79,962	1940	41,22	242309	0,33
Tucuman	108,953	750	145,27	62259	1,75
Salta	88,933	2050	43,38	155847	0,57
Jujui.....	40,379	1000	40,38	93905	0,43
TOTAL..	1,736,923	25292	68,67½	1949268	0,89

We have designedly given the two calculations in this table because, notwithstanding the difference of the figures, which it is impossible not to recognise at first sight as very great, they give force to our previous observations. Still more notable is the difference between the calculations of Dr. BURMEISTER, and the census, respecting the extension of the national territory, for, whilst according to the census, the Chaco is one fourth part larger than the Pampa, and the extent of Patagonia double that of the Pampa, Professor BURMEISTER says, that this is greater than the Chaco, and hardly a third less than Patagonia.

The savage indians—or primitive inhabitants—who wander over these territories, amount according to the census to 93,291.

(*) In the table published by Dr. BURMEISTER in his work, Vol. I, p. 290, some errors occur, which are probably typographical.

TERRITORIES	POPULATION	AREA	
		acc. Dr. Burmeister	acc. the Census
		German Geog. Sq. Leagues	Argentine Sq. Leagues
Chaco.....	45291	5400	20000
Misiones.....	3000	700	2000
Pampa.....	21000	6000	16000
Patagonia.....	24000	8000	35000

Including the Indians already mentioned, and 41,000 Argentines and 6276 soldiers, who were out of the country when the census was taken, we had a grand total of 1,877,490 inhabitants, which, according to the census, would give a mean density of population 0.43 per square kilometer, and according to Dr. BURMEISTER 41.36 per German geografical square mile!

As regards the origin of this population, we ought to observe that the greater part of the inhabitants on the river shores—excepting perhaps, Corrientes — descend from Europeans, whilst in the interior Provinces, especially in Santiago and Catamarca, the Indian blood is more visible. The population in general, is very much mixed, because at the time of the discovery and conquest by the Spaniards, the country was inhabited by divers tribes more or less distinct, the whole of which have been crossed with the *Conquistadores* and their descendants. The Ethiopian race, imported as slaves—which were abolished in our Republic a generation ago —has also taken part in the general mixture of races. To these must be added the European immigration during the past twenty years, principally from the Mediterranean districts, and which daily augments. The immigrant is received here with much hospitality, and he forms a family which contributes to augment the stamp of cosmopolitanism which already characterizes the Argentine nation. To be enabled to comprehend the original character of the inhabitants of this country, it is necessary to travel to the Interior and visit the isolated towns. As yet you find there, that old hospitality of which mention is made in the Old Testament, and men who are untiring in all kinds of fatigue, and models of magnanimity, love of country and valor. This last quality, in particular, could not be more lively, nor more general in any other people; the sons of the Argentine Republic in all the circumstances of life, manifest a supreme disdain of death; and this same virtue—where the customs and habits are corrupt—sometimes causes but small esteem for the life of their neighbours.

The women generally occupy a distinguished position in society, and their influence is considerably felt even in public life. Cheer-

ful and gifted by Nature with all the charms of the Southern races, they are at the same time excellent mothers, who love their children vith the tenderest kindness. The relations of the sons with the fathers are also quite intimate.

The period of physical immaturity is very short, and as a consequence, the youth are occupied in affairs of State and in social circles, at an age in which their contemporaries in Europe would still be ot school.

The Argentines in general, constitute a noble people which claims esteem, and although they have national defects, what country has them not? It is well not to forget, on forming an opinion about them, that they are yet young, as well as that the circumstances, under influence of which they have been formed, and from which they are just commencing to free themselves, were very unfavonrable. A desire for civilisation, the elevated intelligence of the Argentines, and the assiduous zeal they display to obtain that which they have neglected owing to unfavourable circumstances, will gradually correct their defects, whilst their recognized noble qualities, can do no less than secure to them the continued sympathy and sincere consideration of the other nations of the world.

The Argentine is always benevolent aud affable with foreigners; that brusk nativism which in a par of North America treats the immigrants—and even their descendents born in the United States —as insignificant intruders, is unknown in this Republic. On the contrary, foreigners occupy a distinguished position here, and are elegible to almost all public posts, whether Municipal, Provincial or National. The well-educated foreigner has access to all circles and families, and the laborer is received with much kindness. The reader will find all the necessary information respecting the position and political relations of foreigners, in the Constitution which we print farther on.

The formation of classes and castes has not been possible among a people so democratic as the Argentines; every body possesses the same rights, not only in public, but also in social life. Not even the aristocracy of money has found a propitions soil here, whilst on the contrary, a true worship is dedicated to intellectual aristocracy, nevertheless without yielding to in any privileged post or extraordinary rights: for the Argentine is proud; he spontaneously recognizes intellectual superiority, but does not forget his own merit.

The National language is Spanish; yet in some parts of the country, the languages of the primitive inhabitans — above all the *Guaraní* in Corrientes — have not yet been abandoned: this, however, will soon occur. The Argentine learns other languages with facility: French and English — which are taught in almost all the primary and secondary schools — are very well understood

ACTUAL POPULATION EXCLUSIVE OF WILD INDIANS, ACCORDING TO THE CENSUS TAKEN ON THE 15-17 SEPTEMBER 1869, CLASSIFIED BY PROVINCES AND NATIONALITIES.

PROVINCES.		Argentines.		Italians.		Spaniards.		French.		Uruguayans.		Chileans.		English.		Bolivians.		Brazilians.		Swiss.		Germans.		Paraguayans.		Portuguese.		Americans.		Austrians.		Un-enumerated.		TOTAL of		GENERAL TOTAL.
		Males.	Females.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Males.	Females.	
Province of Buenos-Aires.	City.... ..	37846	52175	28883	13074	10486	3512	8625	4777	3249	2738	312	144	2054	1027	60	27	455	262	1030	350	1461	578	437	156	711	67	526	77	499	43	1817	689	98091	79696	177787
	Country..	128433	125772	14667	4062	11786	2750	9867	3872	2137	960	579	152	4285	1686	57	9	328	73	749	240	912	241	578	43	414	36	220	40	102	13	1488	589	176782	140538	317320
	Total....	165919	177947	43550	17136	22272	6262	18492	8649	5386	3698	1071	296	6339	2713	117	36	783	335	1779	590	2373	819	1015	199	1125	103	746	117	601	13	3305	1278	274863	220234	495107
Santa-Fé		39494	35684	3139	1034	1271	288	1192	536	435	236	395	55	494	196	26	5	94	27	1322	950	730	416	63	13	122	5	63	13	26	56	509	233	40375	39742	89117
Entre-Rios		58739	57224	3305	953	2301	724	1641	780	2679	1994	98	35	340	111	55	14	577	223	607	413	263	95	421	60	151	16	36	3	49	1	269	90	71531	62740	134231
Corrientes		56598	63600	1330	183	376	56	356	106	352	170	18	5	88	12	17	3	2374	1449	46	16	102	16	1192	281	116	5	11	2	59	5	68	10	63103	65920	129023
Córdoba		99013	109758	364	32	201	24	215	47	40	20	190	44	155	19	39	13	19	3	78	2	56	11	20	2	9	1	18	1	17	6	91	6	100525	109983	210508
San Luis		24751	28010	17	2	32	3	39	10	8	1	311	69	3	—	2	3	6	—	1	—	14	6	4	1	1	—	—	—	—	—	—	—	25189	28105	53294
Santiago del Estero		65904	66859	24	1	22	4	14	2	1	2	9	4	—	—	14	1	2	—	6	1	5	—	—	—	—	—	2	—	1	—	13	7	66017	66881	132898
Mendoza		28339	30930	69	6	69	6	66	12	7	1	3626	2148	11	—	9	—	9	—	6	—	13	3	2	1	—	—	23	—	2	—	40	15	32291	33121	65413
San Juan		27415	30592	50	4	35	3	38	7	3	2	1398	661	26	—	8	4	1	—	6	—	20	6	1	—	—	2	6	2	3	—	18	7	29029	31290	60319
Rioja		22585	25908	8	—	9	1	11	--	1	—	143	60	1	—	4	1	—	1	1	—	3	—	4	—	2	—	1	—	—	—	4	—	22775	25971	48746
Catamarca		38340	41211	21	6	18	3	9	3	5	4	106	29	17	—	72	44	—	—	1	—	10	1	1	—	—	—	34	6	5	—	11	5	38650	41312	79962
Tucuman		53085	55517	40	2	32	7	62	11	12	4	46	9	3	—	58	15	8	—	6	—	10	2	4	—	—	—	4	—	1	—	9	4	53382	55571	108953
Salta		42897	43062	61	4	37	3	32	2	9	4	41	8	1	—	1589	1083	6	1	8	1	14	1	3	—	—	1	—	—	2	—	39	18	44745	44188	88933
Jujui		18275	19078	11	1	7	2	4	—	2	—	7	—	—	—	1779	1183	1	—	—	—	2	—	—	1	1	—	1	—	—	—	16	9	20105	20274	40379
Total..		741354	785380	51989	19414	27682	7386	22171	10265	8940	6136	7459	3423	7482	3051	3789	2405	3880	2039	3867	1973	3315	1375	2730	558	945	183	945	144	766	68	4392	1682	891590	845333	1.736.923
		1526734		**71403**		**34068**		**32336**		**15076**		**10882**		**10533**		**6194**		**5919**		**5840**		**4991**		**3288**		**1662**		**1089**		**834**		**6071**		**1.736.923**		

throughout the country. Finally, German has been added to the list of studies in various Institutes, and also scientific Germans have been preferred as professors of the chairs in the National University, the Gymnasiums and Colleges.

The density of population and surrounding nature, without doubt, powerfully influence the characters of men: whilst in cities which offer all the enjoyments of advanced civilization, old age as well as youth pursue the amusements and diversions of a pleasant life, the inhabitants of the country, a native of the limitless Pampa, possesses a more serious character, which is impressed on his appearance and influences all his movements. The sprightly melodies of Italian and French music prevail in the cities, but only the monotonous improvisations of the *Gaucho cantor*, accompanied by his guitar, are heard in the country.

The following table composed from the census, shows a majority of 44,000 individuals of the feminine sex. But it should be remembered, that on the days when it was taken, there were nearly 50,000 Argentines — including the army in Paraguay — out of the country, of whom 90 % certainly belonged to the masculine sex: thus this difference disappears, and in reality the register of births, shows more births of males than of females. Again, immigration considerably modifies the numerical relation of the sexes, and it showed then in the total population, 56,000 more men than women. Consequently the real computation would indicate a superiority of 100,000 males. The table shows the proportion of the sexes of immigrants, and to complete these observations we will add, that among the Swiss immigrants the feminine sex is proportionally the greatest, representing 51 %, whilst this per centage is for the French, 42; the English, 41; the Germans, 38; the Italians, 37, and the Spanish, 28.

It is not superfluous to particularly mention here, that all children born in this Republic are Argentines by law, without any reference whatever to the nationality of their parents; as such they are put on the Civil Register.

During the past six years since the census was taken, the population has augmented so much, not only by natural increase, but also by immigration, that its total ought to be calculated for the end of 1875, at not less than 2,400,000 souls.

Of the 1,736,923 inhabitants in September 1869 nearly one third— 400,470—belonged to the cities and towns. The Republic then had:

1	city — Buenos-Aires — with about			180,000	inhabitants.
2	cities.....	„	from 20000	to 30000	„
5	„	„	„ 10000	„ 20000	„
22	„	„	„ 3000	„ 10000	„
67	towns.....	„	„ 1000	„ 3000	„
70	villages.....	„	„ less than	1000	„

The fourteen capitals of Provinces held 305,143 inhabitants; giving 177,789 to Buenos-Aires, the other thirteen united, had only 127,354. Next to Buenos Aires, Córdoba contained the greatest number, viz.: 28,523. The important city of Rosario in the province of Santa-Fé followed it, with 23,149; but at present its population is the greatest of the two, and it is, therefore, the second city in the Republic.

CHAPTER IV.

CLIMATE.

THE city of Buenos-Aires—Capital of the Province of the same name—and temporary capital of the Republic is considered abroad as the representative of the whole country, because it is the best known and most important of its very few ports. As its name indicates, it is an eloquent testimony in favour of the climate. The pure air produced such an impression upon the first colonists, that, in addition to the indispensable saint's name, they added that of "good-airs." Nevertheless, during the past few years "Buenos-Aires" has lost something of its reputation in this respect. Until towards the close of the past decade and the beginning of the present one, this city had been exempt from all epidemics; but latterly, it has had to suffer from the almost criminal indolence of previous administrations. First, the cholera, and next, the yellow-fever, visited this capital; nor is this to be wondered at, because, notwithstanding its extraordinary increase, it was much more backward in respect to sanitary matters, than the smallest village of the old world. The epidemics imported from Brazil, found here a favourable soil for their development, and the consternation caused among the startled magistrates and people, augmented their disasters.

The lesson has been a severe one, but it has produced good results, because the hygienic measures already in execution regardless of expense—and which will soon be completed—will again enable the city to boast of its good name, as an indication of its climate. The air is not corrupted; on the contrary, the Pampero wind—with so much reason esteemed as an element of health—always brings us a pure air from the great wastes. Local circumstances, produced not by nature but by human folly,

occasioned our epidemics; consequently, it is in the power of the inhabitants to prevent their return. The truth of this remark is unquestionably found in the fact, that these epidemics have not returned since 1871, although our ports are in daily communication with Brazil, where the yellow-fever annually claims a greater or less number of victims; and this, too, although our quarantines are not kept with much regularity. It ought also to be remarked, that the epidemic of 1871 was confined to the capital, whilst the country—even in its suburbs—was a secure refuge for the fugitives.

As it is not just to judge of the climate of a whole country from the hygienic conditions of one point alone, so is it a logical error to consider the yellow-fever in Buenos-Aires, in 1871, as a proof that the general sanitary condition is not satisfactory. Although the malignant origin of such an assertion is known, probably it is not superfluous to repeat yet again, that this plague is not endemic here, and that the extensive ravages caused by it ought to be attributed to accidental circumstances, inasmuch as it did not pass beyond the limits of the capital, almost inundated at that time with recently arrived immigrants.

Owing to its vast extent, the Argentine Republic contains almost all zones. The extreme South penetrates the Antarctic region, whilst in the North a perpetual summer reigns, without, however, the excessive heat of the tropics. In the centre of the country the climate corresponds to the Southern part of Europe, and is in consequence, the most agreeable which can be desired. When all our railways are terminated—before long—suffering humanity will be able to reach medicinal retreats, superior to any as yet known. Some instances are already recorded, where the sick, after in vain seeking health in Nice and Madeira, were completely cured in the smiling valleys of the "Sierra de Cordoba," which is much frequented at present, on account of its accessibility, especially by those of unsound lungs.

It would not be reasonable to deduce from our previous remarks, that we enjoy a perpetual spring here, a climate in which all ordinary precautions are superfluous; on the contrary, the configuration of the surface continually causes considerable changes. The country is level, both on the South and the North; therefore it is not protected from the hot North wind, called "Viento Norte" in the littoral Provinces, and "Zonda" in those of the Interior, nor from the cold South winds. Thus a change in the direction of the wind frequently determines a great modification of the temperature, from the influence of which those travellers and immigrants not yet acclimatized, ought to guard themselves; to this end, they should shun all irregularities which are often most pernicious.

EXTRACT OF THE CIVIL REGISTER OF THE GREATEST PART OF THE ARGENTINE PROVINCES. *

PROVINCES	Population by the census of 1869.	Years.	Registered Marriages.	BIRTHS.			DEATHS.			Increase and Decrease per annum.		Increase per Annum.
				Boys.	Girls.	Total.	Men.	Women.	Total.	Decr.	Incr.	
Buenos-Aires.....	495107	1871	4285	12087	10971	23058	18040	13755	† 31795	8737	—	—
		1872	4743	12202	11133	23335	9591	6883	16474	—	6861	1,4%
		1873	5212	12864	12233	25097	8794	6249	15043	—	10054	2 %
Santa-Fé.....	89117	1871	545	1858	1689	3547	1029	699	1728	—	1819	2 %
		1872	680	1879	1710	3589	1048	791	1839	—	1750	3 %
Entre-Rios.....	134231	1871	415	2313	2247	4560	1367	816	2183	—	2677	1,8%
		1872	650	2597	2451	5048	1243	946	2189	—	2859	2,1%
Corrientes.....	129023	1871	401	2234	2258	4492	1135	1155	2290	—	2202	1,7%
		1872	401	3041	2904	5945	540	432	872	—	4973	3,9%
		1873	450	2442	2267	4709	704	586	1290	—	3419	2,7%
Córdoba.....	210508	1872	1425	3450	3278	6728	1644	1484	3128	—	3600	1,7%
		1873	1545	3798	3900	7698	1451	1434	2885	—	4813	2,3%
Santiago del Estero.	132898	1872	646	1025	1014	2039	346	392	738	—	1301	1 %
		1873	576	1217	1180	2397	259	305	604	—	1793	1,3%
Tucuman.....	108953	1871	745	2040	1896	3936	1384	1373	2757	—	1179	1,1%
		1872	810	2246	2124	4370	1021	855	1876	—	2494	2,3%
Catamarca.....	79962	1872	620	1554	1389	2943	425	435	860	—	2083	2,6%
		1873	486	1232	1220	2452	485	429	914	—	1538	1,9%
San Juan.....	60319	1873	352	1335	1104	2439	568	485	1053	—	1386	2,3%
La Rioja.....	48746	1873	216	762	765	1527	223	197	420	—	1107	1,4%
Salta.....	88933	1871	650	1667	1612	3279	1202	1153	2355	—	924	2,4%
		1872	795	1910	1780	3690	998	867	1865	—	1825	2,1%
		1873	791	1525	1468	2993	937	905	1842	—	1151	1,3%
Jujuy.....	40379	1872	320	722	619	1341	264	318	682	—	659	1 8%
		1873	261	727	708	1435	293	339	632	—	803	2 %

* The data are wanting of the Provinces not mentioned. † Of this number 13,761 persons were victims of yellow fever.

Dangerous epidemics — excepting always the small-pox — are very rare in our country; and even this has lost much of its former terrible character, by the increased use of vaccination.

The adjoining extract of the Civil Register of the greater part of the Provinces, cannot be considered entirely exact, because it is defective in some of them; yet it presents a sketch of the sanitary condition of the Republic. (See Table *A)*

As already said, this extract cannot be considered exact, but it serves, nevertheless, to demonstrate that the excess of births over deaths is quite satisfactory. It would be more so, were not the mortality of children—especially those at the breast—so great, on account of bad hygienic conditions.

We ought also to say, that the data are wanting,of some of the departments of the above mentioned Provinces, therefore, these statistics are but fragmentary at best.

A yet more positive proof of the benignity of our climate is furnished to us by the census so often mentioned, in having given the names, domiciles, and other social conditions of 234 persons who had then (1869) passed the age of 100 years, viz. 87 men, and 147 women. We perceive, therefore, that there is one centenarian for every 7,422 inhabitants; whilst in the United States, notwithstanding the numerical strength of the Ethiopian race, whose members generally reach an advanced age under normal conditions, only one centenarian exists in every 10,658, and in Spain one in 71,568.

The following table, based upon the census, explains our preceding remarks; we will only say, that, in the column of "Age Unknown," many inhabitants are undoubtedly found—perhaps more than the half—who had reached more than 100 years; so that there were more than 500 macrobians. This justifies the opinion that in this country there is a centenarian to every 3,500 inhabitants, which in effect shows an extraordinarily favourable condition of climate.

TABLE OF LONGEVITY.

PROVINCES.	Population.	ABOVE 120 Years.	110 "	105 "	100 "	90 "	80 "	Age Unknown.	Total Above 100 years.	One Centenarian in
Buenos-Aires.....	495107	5	17	17	15	179	731	161	54	9168
Santa-Fé	89117	—	1	—	—	44	110	10	1	89117
Entre-Rios.....	134271	1	8	6	8	348	101	10	23	5837
Corrientes.....	129023	2	8	7	7	106	362	156	24	5376
Córdoba.....	210508	3	11	4	5	133	441	—	23	9152
San Luis.....	53294	1	—	4	4	42	106	1	9	5921
Santiago.	132898	3	13	5	1	138	392	11	22	6010
Mendoza.....	65413	1	—	1	4	44	138	—	6	10902
San Juan.....	60319	—	2	3	1	27	99	6	6	40053
Rioja.....	48746	1	2	1	1	55	147	1	5	9749
Catamarca.....	79962	3	9	3	1	51	140	1	16	4997
Tucuman.....	108953	—	3	3	4	66	165	—	8	13619
Salta	88933	4	4	5	5	103	480	—	18	4940
Jujuy.....	40379	2	8	2	7	111	225	1	19	2125
Total....	1736923	26	86	59	63	1447	3637	468	234	7422
Result: One old person of this age in.....		66805	20197	29499	27290	4200	477	3711	7422	inhab.

Not long since a National Institute of Meteorology was founded, attached to the Observatory of Córdoba, whose present chief is the American *savant* Dr. B. A. Gould. This important institution continually improves its organisation, and, notwithstanding the great difficulties to be overcome, it is well advanced already, although it cannot as yet furnish observations from all parts of the country. From some of the Provinces only, have we any data for the year 1874, but even so, these are of great value, because they include points of observation widely apart, such as the South, at Bahia-Blanca; the Central, at Córdoba; and the North. The following tables are reproduced from the annual report of the Meteorological Institute of Córdoba for 1874:—

MEAN MONTHLY TEMPERATURE, CELSIUS.

MONTHS.	POINTS OF OBSERVATION.						
	Salta.	Tucumán.	Corrientes.	Pilciao. (Prov. of Catamarca)	Córdoba.	Buenos-Aires.	Bahia Blanca. (P. of Buenos-Aires.)
January	20°43	23°23	?	28°38	22°78	24°24	24° 1
February	21°10	23°40	?	24°83	21°28	23°44	22° 9
March	18°46	21°42	?	21°94	18°50	21°25	18° 8
April	16°65	19°96	21°12	18°29	14°65	16°94	15° 5
May	12°83	14°19	19°57	14°75	11°94	13°68	11° 6
June	15°07	11°99	17°49	10°26	9°85	11°14	8° 7
July	12°54	12°22	14°46	8°52	8°44	9°82	8° 1
August	14°75	15°92	17°92	13°51	12°07	11°75	10° 2
September	17°86	19°19	18°58	19°36	15°63	13°69	12° 6
October	18°30	19°41	21°35	23°82	16°80	16°85	17° 6
November	20°01	23°36	24°75	24°72	20°21	20°12	19° 2
December	21°10	24°80	26°57	28°38	22°53	22°94	22° 5

ATMOSPHERIC PRESSURE IN MILLIMETERS.

MONTHS.	POINTS OF OBSERVATION.					
	Salta.	Tucumán.	Corrientes.	Córdoba.	Bs.-Aires.	Bahia-Blanca.
January	661 99	721 64	?	721 51	758 37	748 99
February	657 67	721 59	?	722 14	759 14	751 0
March	657 89	721 50	?	723 41	759 92	750 6
April	663 36	723 63	760 02	724 30	761 99	751 2
May	665 07	723 09	760 20	724 63	761 81	750 5
June	663 04	723 28	759 88	723 89	762 73	747 8
July	664 36	724 48	761 18	725 77	765 42	751 0
August	663 28	723 37	760 84	724 96	762 69	749 5
September	661 56	723 35	758 24	723 38	763 04	752 5
October	669 60	721 27	758 64	723 48	761 31	751 6
November	661 14	720 56	759 09	723 28	760 25	750 2
December	660 74	721 47	?	720 84	757 88	748 1

It results, therefore, that the mean annual temperature and the mean annual atmospheric pressure, are as follows:—

PROVINCES.	TEMPERATURE.			ATMOSPHERIC PRESSURE.		
	MEAN.	MÁXIMUM.	MÍNIMUM.	MEAN.	MÁXIMUM.	MÍNIMUM.
Salta	17 28	38 0	0 0	661 75	674 0	625 25
Tucumán	19 05	34 8	3 6	722 442	733 98	711 50
Corrientes	?	35 4	5 1	?	769 3	744 4
Pilciao	19 73	43 1	5 5	?	704 53	685 33
Córdoba	16 19	38 6	6 8	723 48	735 68	708 56
Buenos-Aires	17 11	37 8	2 0	761 1	780 0	742 0
Bahia-Blanca	15 88	39 2	3 9	750 24	782 0	730 0

Observations regarding the amount of rain, are more rare than those which refer to the temperature and atmospheric pressure; we have them from only four points, in only two of which have they been made for some years.

The amount of rain in millimetres was in:—

	TUCUMÁN.	CÓRDOBA.	BUENOS-AIRES.	BAHIA-BLANCA.
Hight of Pluviometer above ground	—	1.50	6.10	—
No. of years of observations	1	2½	14	15
January	263 3	182 05	55 51	28 49
February	217 2	135 45	77 75	53 24
March	209 4	76 75	94 33	54 58
April	39 1	30 70	64 12	44 82
May	27 2	8 07	80 31	19 23
June	0 2	10 86	72 77	25 50
July	9 3	0 20	42 26	11 22
August	0 0	53 60	46 77	17 14
September	0 0	19 02	62 42	46 61
October	36 8	70 95	102 09	56 89
November	56 4	101 97	54 97	48 03
December	196 8	85 70	93 39	44 56
Annual	1059 7	775 33	846 69	450 32

CHAPTER V.

THE PHYSICAL CONFIGURATION OF THE ARGENTINE REPUBLIC

I. General Configuration — The Mountains. *

The Argentine Republic as now constituted, comprehends the greater part of the former Spanish Viceroyalty of Buenos-Aires. Its territory presents a vast plain inclined from the N. West towards the S. East, and from its Western part towards the center, mountains arise, generally narrow and low, and running regularly from North to South, with the Western slope more precipitous than the Eastern. These mountains are generally composed of metamorphic rocks, sometimes with granite caps. Some small streams rise in them as well as in the Cordilleras, all of which run from their sources in the same direction; viz. from the North to the South. Yet by and by, on account of the inclination of the plain, they turn more to the South East towards the River Paraná, which the greatest part of them never reach, because their waters are dried up and absorbed on the way. The Paraná, which is the largest river in the country, rises in many branches in the North, N. E. and N. W., beyond the limits of the Republic, and receives the greater part of its waters from the tropical rains of Brazil. It runs with considerable regularity from North to South, with a short deviation to the West in the lowest portion of the country. Farther on, it inclines to the South East like the other rivers of the country, and empties into the broad basin of the Plata, which receives all the waters of the Interior; that is to say all the meteoric water of that vast extent of South America, which lies South of 15° S. Lat., between the Eastern slope of the table-land of the Bolivian Cordillera, and West of the coast-mountains of Brazil.

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* Vide also; Chap. VI. upon the Geology of the Argentine Republic.

For the purpose of giving greater precision to these general remarks about the configuration of the country, we will say, that these mountains follow — more or less — the direction of the Cordillera, and may easily be considered as its continuations, ramifications or accessory chains, whether found in direct communication with it, or singly following the general direction. Thus we can divide them into four natural groups which we will succintly describe:—

1st, The Cordilleras and their appendices;
2nd, The isolated mountains in the North of the Republic, (which are parallel with the Bolivian table-land);
3rd, The central system of the Argentine plain, represented by the Sierra of Córdoba;
4th, The system of the Southern Pampa, with the peak of the Sierra de la Ventana.

Let us examine these groups a little more in detail, so as to explain their special configuration.

The Cordilleras of the Argentine Republic, commence by a table-land two degrees wide, between 67° 30' to 69° 30' Long. W. of Greenwich. This is the same table-land as that of the Desert of Atacama, and presents an identical general physical constitution. It is divided into various portions by some narrow and shallow vallies, which extend from North to South; three of these portions merit our particular attention. There volcanic peaks appear which rear their heads above the limit of eternal snow, and they are accompanied by other conical mountains, capped with trachyte and porphyry. They all run in the same direction as the vallies — from North to South — but the latter, do not reach the limits of eternal snow.

The table-land has a mean height of 13,000 feet. The limit of eternal snow is calculated here to be 14,500 feet, and the loftiest peaks are more than 18,000 feet high. Four of these, San Francisco, the volcano of Copiapó, the Cerro Bonete and the Cerro del Potro, are found between 26° 40' and 28° S. Lat.

The two principal vallies which divide the table-land into three parts in 28°, change a little more to the South — about 29° 30' — forming isolated chains which gradually separate from each other, into the crest already mentioned, with steep slopes on the West, but far more gentle ones on the East.

The most easterly of these divisions is the Sierra of Famatina, in its origin a direct continuation of the table-land of the Cordilleras; but which, after having left it in 28° Lat. takes a more Easterly direction, whilst the other continuations of the table-land run more to the West. A relatively narrow valley, about three german geographical leagues wide, in which the Jagüé runs, lies between the Sierra of Famatina and the neighbouring Western chains. This

valley opens to the South, whilst that of Famatina is extended to the S. S.-E., and completely lost in the immense plain of the Argentine Pampa. The beginning of the Famatina system, is a mountain in the form of three steps of equal height, which rise successively at 7000, 10,000, and 13,000 feet. This mountain, primarily constituted by sediments of paleozoic formation, is cut up on the South, by a thick layer of granite with strata of porphyry, which rises in the Nevado of Famatina to 18,545 feet. On the West and alongside these peaks, metamorphic rocks present themselves, which increase towards the South, little by little replacing the sedimentary ones. Under this form the mountain gradually lowers down to 31° 40' Lat. where it terminates in a larger point, which bears the name of Sierra de la Huerta, and is separated from the rest by the Valle Fertil. This Sierra de la Huerta is surrounded by a stratum of mineral coal worthy of being worked, and, like its trunk of Famatina, it contains rich mines of copper and silver, which are the origin of a flourishing mining industry.

To the West, and close to Famatina, is found another chain of mountains, a little lower and not so continuous, but divided by various ravines. It partly consists of parallel chains or crests, which also enclose metallic treasures. It ought to be considered as the continuation of the second portion of the Cordilleras, that is to say, of the broad table-land of the East, in which the Cerro of San Francisco and the Cerro Bonete are found. More to the South there are no other snow covered peaks, only low, naked rocks, which appear to be principally of paleozoic formation. The narrow and deep valley of the Blanco river, limits this chain in the mountains themselves, in such wise as to unite it to the table-land of the Cordilleras: in 30° Lat., this river crosses the chain under the name of Jachal, after the village there, and following it, coures at the Eastern foot of the chain in the valley between it and the Sierra of Famatina, it contributes, together with the Jagüé river, to form the river Bermejo in the same valley.

The different portions of this second chain of the Cordilleran system, bear various names, which are those of the small neighbouring Sierras. The most northerly, immediately alongside the table-land of the Cordilleras, is that of Jachal, which closes on the South the ravine where the river Blanco runs. More to the Southward of this ravine, the chain is converted into two parallel crests separated by a narrow valley, in which the river Jachal runs at the foot of the Eastern crest. The two crests both run to the South, being crossed in 31° Lat., by the river San Juan, which forms a ravine similar to that of the river Jachal. The Western crest is the widest and richest in metals: it has various mines in working. The Eastern crest is narrower, and is crossed more to the South in 30° 30' also by the river Jachal, and terminates very near the

city of San Juan, where it is called the Cerro de Villegun. Nevertheless, this termination is only apparent, inasmuch as the chain appears anew on the South of the ravine by which the river San Juan runs, continuing under the form of a very irregular Sierra, until the two crests first separated, again unite in the neighbourhood of Mendoza, under the name of the Sierra de Uspallata, whose highest peak is Paramillo at 8800 feet, and contains silver and copper ores which are worked. Near Mendoza, this chain presents a formation of mineral coal on its edge, but it has not been ascertained whether it is worth working.

The third chain of the Cordillera table-land keeps this name, and extends over the boundaries of the Chilean and Argentine Republics, with a precipitous slope on the Chilean side. On its withdrawing from the western side of the table-land of the Cordilleras, it becomes transformed at 29°30' into two chains, of which the Western is the most elevated, and along its highest ridge runs the boundary line between the two countries; whilst the Eastern chain which is lower and wider, belongs wholly to the Argentine Republic. The two chains are separated by a sterile, uninhabited and very narrow, valley. The peaks which are covered with snow, exclusively belong to the Western chain, the two principal of which are the Ligua — Cerro del Mercaderio — in 32° Lat., and the Aconcagua situated a little to the North of 33° in about 32°41'. The hight of the first is 20,926 feet, or 6798 metres, and that of the second 21,040 feet, or 6834 metres. The former, judging from its completely conical form, is an extinct volcano; the latter which is tridented, cannot therefore be a volcano, as, also, the latest investigations have sufficiently proved.

A profound ravine — the valley of the river Mendoza — divides the Eastern chain on the South of Aconcagua, and follows up to the Western crest at 12,000 feet high, where the Paso de la Cumbre —pass of the top—is found. To the South of this valley the Cordilleras continue, the Eastern one being formed by a thick mass of porphyry, where some peaks appear covered with snow: the highest of these is calculated to be 18,000 feet. The two chains enclose a narrow valley at the hight of about 10,000 feet; towards the South it grows still narrower, terminating in the volcano of Maipo. The highest peak in this part of the Cordilleras is Tupungato, an extinct volcano of a beautiful bell-shape, and some 19,000 feet high. It is situated in the Western chain, and is distinguished from every point of the surrounding plain. From Maipo, whose height is 16,570 feet, the Cordilleras form a single chain, in which twenty four volcanos covered with snow, rear their heads, but only thirteen of them are in activity. Inasmuch as they are situated on the Chilean side, we will not notice them. Here the Cordilleras sink twice, in such wise that they leave a

depression or breach. Finally in the Straits of Magellan, and whilst the ridge dips to the South more and more, the sea cuts it off, separating Tierra del Fuego from the American Continent.

As a second system of mountains, we have mentioned the chains which form the Northern limit of the Argentine Republic in its Western half, and which separate it from Bolivia.

It may be said that the relation of these mountains to the Bolivian table-land—or Eastern part of the Cordilleras—is the same as that of those we have just described, and among which in the South, the table-land of the Argentine Cordilleras changes; these mountains are its promontaries, even as those of that table-land are its branches. The center of this system also forms a table-land situated to the East, and adjoining the desert of Atacama, and known under the name of Sierra Despoblado or table-land of Puna; a sterile spot without population or water, similar in aspect to the table-land of the Cerros of San Francisco and Bonete. Its approaches are waste ravines which ascend on both sides to the table-land: but we are only interested in the Southern ravines, because the Northern ones in reallity lead to Bolivia, whose boundary with our country is on this table-land, until it meets the river Tarija in 20° Lat., and continues on this parallel thence to the river Paraguay. On this question of limits, however, negotiations are pending between ourselves, and the two neighbouring Republics of Paraguay and Bolivia. The Southern ravines ascend the table-land in a direction of S.S.E. to N.N.W. in parallel lines, bordered by crests of woods which descend from the table-land, always preserving their original configuration.

The narrowest valley is that of the river Calchaqui; that of the Tontal river follows it; then a third, that of the Rosario river; and, finally, a fourth, that of the Arias river, upon which is situated the city of Salta on an open plain. These four rivers form together the Guaychipas, or Huachipas river, which runs from S.W. to N.E. in a wider valley parallel to the table-land of Despoblado, i.e., the edge of the great Bolivian table-land, to which, moreover, is added the River Santa Maria, which springs from a ravine on the West, and flows N.W. to the South of the Arias; the Guaychipas flows to S.E., cutting the chains parallel to the Despoblado table-land, and entering the plain of the Pampa, continues its course to S.E. under the name of the Salado, until it empties into the Paraná near Santa-Fé.

The Eastern crest adjoining the valley of Salta, separates this river from the Vermejo river, whose sources or branches spring from the ravines to the N.E. and S.E. of these mountains. The most Westerly ravine—the valley of Jujui—originates the most Westerly branch, the Grande river of Jujui; and, like the valley of the Calchaqui river, it runs from North to South, and forms

the two principal causeways—the old and the new—between the Argentine Pampa and the Bolivian table-land. The central part of Despoblado is narrower here, therefore the pass is easier; nevertheless, it is from 3,500 to 4,000 metres high, and follows on the Northern slope the valley of San Juan river, which takes the same direction as the Guaychipas, i.e., from S.W. to N.E.. although on the other side of Despoblado. Formed by the confluence of the Suipacha and Socacho rivers, it becomes the S.W. branch of the Pilcomayo. The rivers which spring from the Eastern and S.E. water-sheds, run to the Vermejo. Over and above the Grande river of Jujui, which comes from the West, there is the Porongal, and alongside, the two Eastern branches of the Vermejo, under the names of Vermejo-Chico and Tarija rivers. These three run parallel to the Jujui river, and deviate on the S.E. at the end of the most Easterly crest of the Despoblado system, and finally unite with the Vermejo in the plain. This river, like the Salado, runs a general direction to the S.E., following the inclination of the surface, and empties into the Paraguay river, a short distance above its mouth in the Paraná. The oriental crests of the Despoblado system, between which the branches of the Vermejo are found, are narrower but longer than the Western crests; their valleys are wider, and at some points, especially on terminating, they are covered with magnificent forests, which extend to Oran, and contribute to make these districts the most picturesque of the Argentine Republic. Here the cultivation of sugar and coffee is prosperous, and the banana grows spontaneously as in Brazil: but its isolated situation, and the difficulties which the navigation of the Vermejo presents from want of water in certain seasons of the year, have hindered the increase of population.

The great valley—in the Western half of which runs the Guaychipas river, whilst the Grande river of Jujui runs in the lowest part of the Eastern half—forms the limit of the Despoblado system; the elevations found to the South are only isolated mountains. To these latter on the East, belongs the Sierra de la Lumbrera, which rises on the Eastern shore of the Salado river, where it enters the plain, and, extending to the N.E. as a quite narrow and simple crest as far as the Vermejo, determines the direction of its Western confluents. It therefore runs parallel to the edge of the Bolivian table-land, and constitutes its Southern mountainous margin. The great, but dry, plain of the Chaco, covered with forests, which borders the River Paraná, near the mouth of the Salado, commences alongside of this elevation.

The chain of the edge of the Despoblado, continues to the West of the Salado, under the name of the Sierra de Cachaví,

and is the same which farther on, under the name of the Sierra de la Frontera, constitutes the boundary between the Provinces of Salta and Tucumán, and which lower down, more or less in 66° Long. W. and 26° 15' S. Lat., unites with the Northern extremity of the Sierra of Aconquija. This high chain represents the second system of the Argentine Republic, and some of its peaks—as in the Famatina chain — rise to perpetual snow, the hight of 16,290 feet, or 5,300 metres. The principal mass is a mountain which runs North and South a little Westerly; it has one degree of Longitude, and its most elevated peak is situated in the same 27° Lat. The Western slope of this chain is very steep, and without deep ravines; the Eastern presents lengthened crests, with deep vallies covered with forest, whilst the hard rocks on the West, are completely naked. From this central mass some branches diverge to the North and South; the latter form the Sierra of Tucumán, whilst the former constitute three separate chains under special names.

The Sierra of Tucumán is situated in front of the N.E. edge of Aconquija. It is composed of five summits one behind the other, which, where they unite with Aconquija, form the high valley of Tafi, celebrated for its Alpine cattle which produce such excellent cheese. This valley—the same as the five ridges—is covered with rich pasturage, whilst the forests are only found on the extremities of the slopes. Abundant streams ramify in these hills, originating numerous rivers which gradually unite to the river Tucumán, which is named the Tali in its upper section, Dulce, in the middle, and Saladillo in its last section. Yet this river does not reach the Paraná, towards which it flows parallel to the Salado, because it disappears in a quagmire called the Laguna de los Porongos, which has no outlet. The abundance of water in the Province of Tucumán, is the cause of its fertility, since the elevated summit of Aconquija, covered with snow, condenses the atmospheric mists which the S.E. monsoons carry to it, thus originating the copious rains which fall upon its Eastern slope, and which sometimes are almost converted into deluges, whilst the Western slope is not refreshed in a similar manner.

The ridges which extend towards the South from Aconquija form three elongated chains. Two of these branches of Aconquija, the Sierra del Alto, or of Ancaste, and the Sierra of Ambato, extend in a regular manner from North to South, parallel to the table-land of the Cordilleras, enclosing the valley of Catamarca: the third branch—the Sierra del Atajo—first extends to the West and then to the S.W., from the end of the Western slope. It terminates in the Punta, which advances on the South to the plain, presenting on the West, in its turn, the Sierra of

Belen, which is separated from the Sierra del Atajo by a narrow ravine. This Sierra de Belen constitutes the first oriental chain of a series of low promontories which run parallel to the Cordilleras, and start, as a rule, from the edge of the Despoblado. They are as follows: from East to West the Sierra of Gulumpaja, that of Zapata, the Cerro Negro, the Sierra of San José; and that of Copacabana, all low and narrow chains of metamorphic rock.

The same relationship of these mountains to the Cordilleras, is again found more to the South, in some others which are all Southern branches, and to be considered as parallel to the Sierra of Famatina, an Eastern branch of the Cordilleras. To this branch belong the Sierra of Velasco and the Sierra de los Llanos, which are almost isolated on the plains near Famatina. The Sierra of Velasco is wide and massive, and formed of various crests which converge in the middle into a single one, which is divided by a stratum of granite that constitutes its center, just as the top of Famatina in its turn, constitutes the center of this chain. The height of Velasco, nevertheless, is much less than that of its neighbors, it being only 2,250 metres, whilst the precipitate crests dipping East and West, rise from 1,500 metres on the Eastern water-shed, to the height of 2,600 metres on the Western slope.

The Sierra de los Llanos, which runs parallel to the extremity of the Famatina chain, and which consists of two or three narrow and isolated series of broken ridges, is even much more insignificant, and is perfectly similar to that final point of the chain of Famatina, which bears the name of the Sierra de la Huerta. The greatest part of these small ridges hardly have a breadth of five or six leagues and a hight of 600 metres; some of the peaks perhaps reach the hight of 1,000 metres.

On the other side to the West of the Sierra of Famatina, another small massive mountain is found, which is called the Sierra of Pié de Palo. It extends towards the East of San Juan, and this place also gives evidences of Plutonic forces. If a glance is cast upon the map—and these mountains be examined from afar in preference to close at hand—it will be observed with surprise, that they all stretch forth in the same direction, and are situated at almost equal distances the one from the other; as if the forces which raised them had been repeated at equal distances of time. In no part of the earth can the regularity of Plutonic action be better studied, than in those great and small chains which, in reality, belong to the geological formation of the Cordilleras, but are dispersed to a certain extent over the Argentine plains.

Let us now pass to the consideration of a third group, previously called the central chain, which differs in no wise from

those we have just described, except in its locality. Thus we demonstrate, by its similarity to the others, the correctness of our opinion in reference to the regularity of the forces which created them. The centre of this system is the Sierra de Córdoba, which is a group of three chains that run parallel to each other from North to South, and as usual the Western slope is more precipitous than the Eastern slope. They all have the same direction as the Southern branches of the Aconquija; the most Western of the chains of the system of Córdoba, running under the same meridian as the Sierra of Ancaste. The three chains which form the Sierra of Córdoba have neither the same breadth nor length; the Sierra of Campo, on the East, is narrow, and hardly reaches the hight of 1,000 metres, with a few peaks a little higher. It runs to the North, towards the plains, where some peaks of granite and broad crests are seen; the remainder being composed of marble and metamorphic rocks. The second chain bears the name of the Sierra de Achala; it is wider and more elevated, and its principal peak, called the Gigante, reaches the hight of 2,300 metres. This Sierra extends much farther than the other—even to Achiras—and, on the North, presents the same small branches which we have met in the first chain, and which terminate by a wide edge or point, adjoining the Salina Central.

The third chain, which is called the Sierra Cerrezuela, is narrower and shorter; it is almost of the same breadth as the first. Some summits of trachyte reach the hight of 1,900 metres, and alongside, as far as the slopes of the second chain, is a valley richly adorned with palm-trees. Among, and above, the summits of granite, on the North of the first chain, exists a forest of the same palm-trees.

In addition to this triple chain of the central group, some additional chains present themselves on the South West, known under the name of Cerrezuela and the Sierra del Morro; the Sierra of San Luis rises alongside on the West, and whilst gradually descending and dividing on the East, on the West it is an escarpment. Its mines of gold are celebrated, and have been worked for a long time, but with little energy. Its correlation to the Sierra de los Llanos is the same as to the isolated crest of the Sierra del Gigante, which is found on its Western side, and also with the Sierra de las Palmas which may be considered as a continuation of the Sierra of Famatina; likewise, the Sierra de los Llanos is only a Northern continuation of the Sierra of San Luis, inasmuch as all these Cerros, more or less small, have the same aspect, and are perfectly like each other, so far as respects their petragraphic character.

We will terminate our examination of the mountains of the Republic, with some observations upon the fourth system, which

is the Southern one of the Pampa, showing itself between 37° and 38° S. Lat. at a considerable distance from all the other mountains. At this point two small chains run parallel to each other from N.W. to S.E., showing several more or less isolated summits of metamorphic rocks, with a granitic base. The Northern group forms a series of small crests of 450 metres high at most, the Northern slope being much steeper than the Southern one. This Sierra extends across the semi-lunar projection made by the coast into the Atlantic Ocean, to the Southward of the Rio de la Plata. The central portion bears the name of the Sierra del Tandil; the Eastern extremity that of Sierra de los Padres, and alongside it, that of Sierra del Volcan; whilst the Western end is called the Sierra de Quillalanquen. At Cape Corrientes some of its rocks even touch the waters of the Ocean. On the South, the Sierra de la Ventana runs with the same inclination; its central summit is 1030 metres high, thus forming a somewhat important ridge which goes on towards the S.E. under the name of Sierra de Pillahuinco, and to the N.E. under that of Curamaral. * Both these chains present the same slightly elevated forms as the preceding chain. The protuberance of the coast which commences at the mouth of the Plata finishes—together with these Southern mountains of the Republic—at Bahia-Blanca.

On terminating this general description of the chains of Argentine mountains, we ought to observe that the two last of the fourth system, do not run from North to South like the others, but on the contrary, present a characteristic direction from N.W. to S.E. which demonstrates that they belong to another upheaval not in communication with the system of the Cordilleras. The similar direction of the "Cuchillas" or small crests of the Uruguayan Republic, appear to indicate that the Southern system of the Pampa is in relation with the Uruguayan system, and that they more likely belong to the upheaval of the mountains on the coast of Brazil, than to that of the Cordilleras.

II. The Argentine Plains and their Divisions.

The principal territory of the Argentine Republic, spreads out under the aspect of an inclined plain from the N.W. to S.E., which, as we have already said, bears the name of the Pampa. To indicate with greater exactitude this inclination, we will cite here some determinations made for the purpose by Prof. Burmeister.

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* It appears that the Sierra of Curamaral is—by means of some small elevation and hills—in communication with the Sierra of San Luis.

The hight of the village of Copacabana at the Eastern foot of the Cordilleras has been determined at 1168 metres; and that of the city of Mendoza, close to the Sierra of Uspallata, to be 772 metres. Rio Cuarto, situated almost at mid distance from Mendoza to Buenos-Aires, shows a hight of 414 metres, but the edge of the Central Salt-Deposit, almost in the middle distance which separates Copacabana from the Paraná river, near the village of Las Toscas, has an elevation of hardly 188 metres. According to observations of Capt. PAGE, the hight of the Paraná river near the city of Buenos-Aires, is 10 feet above sea-level; 60 feet near Rosario; at La Paz, in almost the same latitude as Las Toscas, it is 100 feet; near Corrientes, 200 feet, and in 22° Lat., 300 feet. The Great Central Saline is therefore the lowest part of the Argentine plain, because its center is hardly 165 metres above the level of the Paraná in the same latitude. Of the most Southern part we have as yet no observations; all we do know assures us that the Patagonian plain is quite high, and presents at all points of its coast, banks which rise towards the Cordilleras, where they are generally provided with two great appendages in the form of steps, which surround the aluvion situated at the foot of the Cordilleras. In the beds of the rivers which run through the Patagonia plain, fragments of rocks from the Cordilleras are found; the fossils in these stones sufficiently prove their Andesean origin. These stones are found even on the Atlantic seaboard.

The surface of this great plain does not always present the same configuration, but it is divided according to its differential peculiarities in various distinct portions, which we will study separately.

We must observe firstly, that notwithstanding the inclination of the Pampa is directed in general from North to South, it does not present a homogeneous or regular level; rather it resembles a broken beach, very much spread out in certain points, but, owing to the mountains that extend themselves in the same direction, it is divided into various valleys of slight depth which we will now describe:—

1st. The valley of the North-East is the most extensive. On the N.W. this is limited by the system of the Despoblado, and that of the Sierra of Aconquija; on the W. and S.W. by the Sierra of Córdoba and its Southern appendages to the Lat. of Santa-Fé. On the North, it is the continuation of the plain of the interior of Brazil; the rivers Paraná and Paraguay, forming its Eastern limits. All the confluences of these two Argentine rivers, belong to this basin, which we shall call the basin of the Paraná. The provinces of Salta, Tucumán, Santiago del Estero and Gran-Chaco, the Eastern portion of Córdoba and the Northern half of that of Santa-Fé, also belong to this basin.

2nd. On the Western side, a narrow but very characteristic region

is found, which commences, on the North of Catamarca, and includes the whole of that Province, the N.W. part of Córdoba and the Eastern half of that of Rioja as far as the Sierra of Famatina, and continues to the S.E. across the province of San Luis, thence running to the South across the Pampa. This portion of the Republic is a waste; not a single river of moderate importance waters it, and its natural pastures are not extended in the Southern part: it contains the greater part of the Great Salt Deposit, to which in following Chapters, we will make more explicit reference, and from which it could be denominated "the Salt region."

3rd. A third plain extends to the West; it begins on the N. W. of the province of Rioja by the narrow valley of the river Jagüé, between Famatina and the Cordilleras, then continues to the South through the territories of San Juan and Mendoza; on the East, it is limited by the Sierras of the Gigante, Palomas, and Alto Pencoso; thence more to the South, it touches the lagune of the Bebedero with its marshy soil, and proceeds onward to the South, as far as the latitude of the Sierra de la Ventana and Bahia Blanca, where its profound indentation marks its Southern limits. Although there may be more water in this region than in the last, it nevertheless, does not possess a single navigable river, until the Colorado is met: it is, however, more favourable for agriculture, on account of the facility of establishing irrigation. The vegetation is poor, and consists of hard plants with long thorns; the forest is entirely wanting, for which reason this plain has less importance than the two preceding. Mr. BURMEISTER calls this region "the sterile Pampa."

4th. The S.E. portion of the preceding, ought to be separated from it under the name of "the fertile Pampa;" it is a continuation of the Paraná which it meets in 32° Latitude, and extends from that degree to the Sierra de la Ventana and Bahia-Blanca. This region is a true plain almost without interruption, and is generally carpeted with the compact fibres of some of the Gramineæ which make — particularly in the province of Buenos Aires — pastures in all respects fit for the breeding of cattle. Trees are entirely wanting on these plains, and only upon the shores of the streams and greater rivers are found occasional groups of an indigenous species of willow *(Salix Humboldtiana*, WILD.) But a great quantity of lagunes exist, which being made only by the meteoric waters, are extremely irregular in their condition. The soil displays the same character in the province of Buenos-Aires, the Southern half of Santa-Fé and Córdoba, and the Northern part of the Patagonian plain to Bahia-Blanca. But to the N.W. and W. the "sterile Pampas" show themselves, and on the N.E. begins the Gran-Chaco being covered, little by little, with forests.

5th. On the South adjoining both the fertile and sterile Pampa,

the characteristic territory of Patagonia is found: it is little known as yet, its exploration has recently commenced. The little we do know about this extensive region will be found in Chap. VII — *Sketch of the vegetation* — of this book.

6th. Without any connection with the systems already mentioned, and more inclined to the S. E., we find that portion of the territory of the Republic which is situated between the rivers Paraná and Uruguay, and for that reason properly called the "Argentine Mesopotamia." This region consists of some plains of little depth, and includes the Provinces of Corrientes and Entre-Rios; on account of its hills and rolling-country, it is more like the Southern portion of Brazil and the Republic of Uruguay, than any other portion of Argentine territory. The Pampas are completely wanting, as also the rocks and sterile plains; a thick sod covers a broken country, and magnificent trees shade the valleys and the shores of the great rivers, into which pour numberless streams that rise in the centre.

III. The Rivers of the Argentine Republic.

The general features of our rivers are so many obstacles to their navigation. Not only have they wide and shallow beds, but they hold little water, and in the plains have many curves. There is not one of them which is uniformly navigable throughout the year. Even the immense Paraná changes its bed without ceasing, forming new bars, which require an eternal vigilance on the part of the pilots of large vessels. It is easy to explain the origin of these difficulties. All the rivers which take their source in the Argentine Republic are not abundant in water, on account of the irregularity of the rains throughout the West of the country. Those rivers which descend the Cordilleras are also poor enough, because there the rains are rare, and the snow is only met with on some of the summits. The high temperature of summer favors the evaporation of all the small rivers of the Cordilleras, and they dry up before arriving at the Paraná or the Ocean. Moreover, the level over which these rivers run is so slightly inclined, that, whilst it is extraordinarily ample, full space is given for the numberless curves or bends which they all possess.

Inasmuch as the soil of this plain is composed of fine sand and clay, at every freshet the waters undermine considerable portions of the shores, thus widening the beds, and forming new

banks or bars at the conclusion of the freshet; inasmuch as all these rivers are wanting in solid bottoms. This phenomenon is seen even in the Paraná, which is the largest river of the Republic. Its bottom is moveable and its shores soft, in such wise that the waters are continually bringing down great portions of them; thus, the channel bed is constantly changed, and it is this inconstancy which makes its navigation so difficult. For all these reasons the great commercial city of Buenos-Aires still wants a port; all the vessels anchor farther than a league from the coast, because the banks do not permit a nearer approach.

To make a general description of the rivers of the Republic, it is necessary to classify them into the five following groups:

1st. The system of the Rio de la Plata, and its mouth.

2nd. The central system, some of which only reach the Paraná, although all set out on the journey.

3rd. The system of the Cordilleras, of which no river reaches the Ocean.

4th. The system of the Pampa, to the South of Buenos-Aires.

5th. The Patagonian system, of quite large rivers which rise in the Cordilleras, and reach the Ocean.

In the order enumerated we will successively examine these five systems.

The system of the River Plata—one of the greatest in the world—is formed by the confluence of six large rivers, one of which—the Uruguay—empties separately into the Plata, whilst the others successively empty into the Paraná, which is the largest and longest of all these rivers, and easily absorbs them. Two of these six come from the N.E·, the Paraná and the Uruguay; three—the smallest—from the N.W.; and finally the last—which is the Paraguay from the North—may be considered as the axis of the whole system, inasmuch as it gives the general direction to the whole. Of these six, only one, the most Westerly—the Salado—is completely Argentine, because the others rise beyond the limits of our Republic; on this account we will only speak of them *en passant.* We will begin by the Western, or properly-speaking, Argentine river. The Salado receives its waters from the Western valleys which run towards the S.E. of the system of Despoblado, by the five branches already mentioned in the description of the mountains. From West to East these are the Santa-Maria, the Calchaqui, the Tontal, the Rosario, and the Arias rivers, all of which empty into the Guaychipas, this being the beginning of the Salado. This river, which here bears the name of Juramento, bursts the chain of mountains to the S.E., between the little villages of Pasaje and Las Piedras, and runs around the Sierra Cachari, and, adjoining the Sierra Lumbrera, it enters the plain, and coasts along the Cerro-Colorado, which inter-

cepts its passage by a curve to the Eastward. Up to this point the river holds much water, receiving here the streams from the Sierra of Burruyaco, in 26° 40' Latitude; it gradually diminishes 27°, where it takes a disagreeable salt-taste from the lixiviation of the soil, whence it is now called the river "Salado." It is then lost in the quagmires or low-lands, and again appears in 29° as a simple river, which continues its course to Santa-Fé, where it empties into the Paraná.

A similar river runs from the West parallel to the Salado, but it which does not reach the Paraná. Yet it ought to be considered as belonging to this system, because it has the same character as the preceding; it is the river Dulce, or Saladillo. It rises in the S.E. slope of Aconquija, and at first is quite abundant in water, which it loses by-and-by in the plain. Near the city of Santiago del Estero it crosses the Saline and becomes salt; it then loses itself in some marshes, and finally in the Laguna of Los Porongos, in 63° W. Long. Greenwich, and 29° 30' S. Latitude.

The river Vermejo is the second river in point of size of the Western portion of the system of the Paraná; it does not empty directly into the Paraná, but into the Paraguay, some 10 leagues above the junction of this latter with the Paraná.

The Vermejo flows by two branches from the E. and S.E. edge of the Despoblado system. Above the confluence of these two branches it receives the Del Valle river, a small stream which rises in the Gran-Chaco, and empties near Esquina-Grande. Thence it branches out and divides in such a manner, that its depth diminishes considerably, thus rendering its navigation more difficult day by day. Lower down, this river curves so much and so constantly, that a voyage by its course takes much time. All these difficulties will be overcome by an artificial canal carried out by a subsidized company.

The third Western confluent of the system of the Plata is the river Pilcomayo. Its head-springs are situated between the Despoblado and the edge of the Bolivian table-land; the Southern ones start from the ravines of those mountains, and the Northern ones from the water-shed of the table-land. This river appears much like the Vermejo; it runs through a waste land, loses much water by evaporation, receives only small confluents, and at some bars which it flows over, it is converted into marshes which make it innavigable. It empties into the Paraguay river between 24° 30', and 25° 30' Latitude. In view of the claim of Paraguay—which is situated between the rivers Paraná and Paraguay—to possess the whole of the territory to the North of the Pilcomayo, the Argentine Government has established a strong garrison in the Villa-Occidental, situated

24 miles to the North of the principal mouth of the Pilcomayo, for the purpose of proceeding to colonize these rich districts, only peopled to-day by a sparse population of Indians.

Chaco is a Guaraní word which means hunting-ground.

The Paraguay river, which forms the axis of this system, must be considered as the fourth confluent, although, inasmuch as it follows exactly the general direction, it could be considered as its beginning. It rises in the most Northerly portion of this system, almost in the centre of Brazil, at 58° W. Longitude Greenwich, and about 14° S. Latitude, where, it is said, seven small lakes constitute its source; but this assertion has latterly been denied. Its upper course receives various confluents from both sides; viz. the Guayada on the East, and the Jaurú on the West, which are the largest. Near the mouth of the latter, the Paraguay enters an extensive flat, where, during the annual rainy-season, it appears as a great lake, and it is here in the marshes of the Xarayes, where the Guayada joins it. These two rivers are navigable above their junction with the Paraguay. Farther down, the Paraguay receives the waters of the Tacuarí, or Jaurú-Guazú, from the East; of the Laritaquiqui from the West; and, again, others from the East, of which the most important is the Mondego, or Mbotetey, near the mouth of the Tacuari. It empties itself into the Paraná river in 27° 12' S. Latitude. The whole of this river is navigable to near its sources, and it is of the highest importance, not only to the Argentine Republic, but also to Brazil.

The Plata receives the principal part of its waters from the Paraná, which is the fifth confluent and largest of all these rivers; its length to its mouth, being about 500 geographical leagues. It rises in numerous branches on the Western water-shed of the principal chain of the coast-mountains of Brazil, called the Sierra de Espinhazo, and on the Southern drainage of the small cross-chain of the Montes Pyreneos in 16° S. Latitude, which separate the waters of the Paraná and the Tocantins. Numerous streams descend from these two chains, which successively flow to two greater rivers, of which the Easterly is called the Rio-Grande, and the Northerly the Paranahiba. Their confluence is in 51° W. Long., and about 20° S. Lat. From hence the river takes the name of Paraná, and runs to S.W. until reaching 22° 30' Lat.; thence it deviates to the South, with a slight inclination to the West, as far as 27° 28', where it takes a well pronounced turn to the W., and runs on, slightly inclined to the North, until it meets the Paraguay. Thence, after the junction, it continues the course of the latter, *i.e.*, to the South, with Westerly inclination; thence to S.E., with a curve in 33 deg., and reaches the Plata under the 34 deg. Lat. through several

different months. In the beginning, its direction is the 59 deg. Long., then the 60 deg., and at 60° 45' it inclines to the S.E. In its first section on Brazilian territory it receives many confluents, among which those from the East are the largest, and spring from the Western water-shed before mentioned of the coast range of Brazil. Under 24 deg. Lat. it constitutes the boundary line between Brazil and Paraguay, where the hills of Maracayá obstruct its passage, and cause falls and cataracts which totally impede its navigation. In Argentine territory it receives no confluents of any importance, only some small streams which descend from the central hills of Entre Rios and Corrientes. Its confluents from the West are equally insignificant, until it arrives at the mouth of the Salado; further South it receives the Carcarañá and some small rivers of the Province of Buenos-Aires, which are in general, more insignificant than those of the Argentine Mesopotamia. No part of these small rivers is navigable, excepting only the inferior portion of some of the largest in the Southern part of the Province of Entre-Rios.

We will now study the Uruguay river, the sixth confluent of the Plata. It does not appertain to Argentine territory, inasmuch as it only forms its Eastern boundary. It is a deep and wide river, and navigable to the falls in 31° 5' S. Latitud Like the Western source of the Paraná, it rises in the line of coast-mountains in Brazil, about 27 deg. Lat., and first runs parallel to the West with the Coritiba, the last great confluent of the Paraná; thence it takes a curve to the South in 27° 20' where it borders the Jesuit Missions, and runs to the South in small curves and parallel to the Paraná, only distant 10 or 12 leagues; thence it runs South, to its mouth in the Plata. On the Western or Argentine bank it only receives some small streams, whilst the Rio-Negro which is the largest river of Uruguay, enters it on the East. On the North, in Rio-Grande, it unites with the Ibicuí, which is somewhat smaller.

But enough has been said about the rivers which form the Rio de la Plata; our attention is now claimed by this river itself. It is only the wide mouth which bears this name, whilst at the narrow head the Uruguay and the Paraná empty. This great river, or rather estuary, is 40 geographical leagues long, and at its mouth about 30 leagues wide. Properly speaking, the mouth is bounded on the North by the point of Maldonado, and on the South by the angular cape called Punta Norte. Between these two is the mouth, which forms at its extremity the bay, more resembling a sea than a river. Between Montevideo and Punta Piedras it is only about 14 leagues wide. It is here where the influence of the fresh water begins to be felt, although from hence to the confluence of the Uruguay and Paraná rivers, the

distance is yet 25 leagues, with a varying width of from 8 to 12 geographical leagues. Between Colonia and Ensenada is the narrowest lace, as their distance apart is only seven leagues. The whole shore of the mouth is surrounded by banks, and it is only navigable for vessels of light draught. The Bank of Ortiz is situated in the middle, rather more to the Northern shore, and some other small banks are found outside of Montevideo, of which the English Bank is the most dangerous, on account of the great number of shipwrecks it has caused. The Bank of Arquimedes is more towards the centre of the mouth; it is larger, though not so dangerous, because the channel is distant. The islands of Lobos are outside of the mouth, whilst that of Flores is in it, near to Montevideo. Both are formed of stone like the Argentine island of Martin-Garcia, which is situated at the innermost point from the mouth.

The second Argentine fluvial system which we have denominated the Central system, consists of five small rivers and some streams, which descend from the Sierra of Córdoba and its appendages, in an Easterly and S. E. direction, as if seeking the bed of the Paraná. Only one of them reaches it; it is the Carcarañá, or Tercero river, the five are short but wide rivers, and near to the mountains their beds are formed of stones and clay; only lower down does the sand appear in banks at low water, among which pass narrow channels. Where the bottom is of stone, the water is clear, and the inhabitants on the shores are delighted with its healthy and agreeable taste.

With the exception of the Tercero, these five rivers have no proper names; they are only distinguished by numeral adjectives from North to South.

The river Primero rises like the others between the first and second chain of the central mountains, near the Northern border of the valley of Punilla, and runs to the South as far as San Roque, under the name of San Antonio. Here, it receives a branch which comes from a narrow ravine to the West of the Gigante de Achala, crosses the first chain near that village, and runs towards the East as far as the marshy lagune called Mar-Chiquita, where it empties. The city of Córdoba is situated on the Primero.

The Segundo river leaves the Sierra at the distance of 8 leagues from the Primero, and later on, approximates to it within six leagues. Five small streams contribute to form it; they start from the narrow ravines of the second chain, and simultaneously cross the first chain at two points near Anisacate. This river runs parallel to the Primero, and like it is lost in a marshy basin.

The Tercero or Carcarañá river, rises in the mountains near the village of Salto, 12 leagues distant from the Segundo, and is fed by 3 large and some small streams, which also rise in the Eastern slope

of the second chain. In the beginning, it flows towards the East, then E.S.E., further down in Lat. 33° entirely to the East, where it joins the river Saladillo, and receives the name of Carcarañál which runs to the N.E. and empties into the Paraná near the ancient fortress of Espiritu-Santo, built by SEBASTIAN CABOTO.

The Cuarto river is formed by three streams which come from the Eastern slope of the extremity of second chain, and runs to the S. E. as far as the small village of the same name, which is situated upon its Southern shore. By and by, it doubles to the East, and near the village of Saladillo unites with the Tercero, thence taking the name of this village. At this point it has little water, and even completely disappear at some points.

The Quinto river rises in the S.E. slope of the Sierra de San Luis from several streamlets flowing between the small summits which form this mountain. At first it runs to the S.S.E. then to the E.S.E., and in 35° Lat. it comes to an oblong flat where it disappears. The centre of this flat is the basin of the Laguna-Amarga, surrounded by hills and ancient sand banks, characterized by a better vegetation.

In addition to these five rivers which run from E. to S.E., the Sierra of Córdoba and the neighbouring mountains, give rise to some other small rivers which run to the West and N.W.; but with much less water, they are not long in disappearing in the sand. We will only mention the following:—

The Siguiman river which comes down from the extreme N.W. of the Sierra of Achala. The village of Cruz del Eje is on its bank.

The San Carlos river, which comes from the valley between the Sierras of Achala and Cerezuela.

The San Pedro river which also rises in this valley but a little farther to the South; it unites near the village of Dolores, with the river Conclare which runs to the North between the Sierras de San Luis and Cerezuela.

There are, moreover, two small streams which rise in the Western slope of the Sierra of San Luis, and form the Seco river.

All these streams only serve to irrigate the neighbouring plantations, and in years of drought some of them are completely dry.

We now come to examine the System of the Cordilleras. To this system belong those rivers which descend from the Cordilleras between the 27° and 34° of Lat. and run in an Easterly direction to the neighbouring plain, there losing themselves without taking a single drop of water to the Ocean.

The first, that is to say the most Northerly is the river Copacabana, lower down called the Colorado. Its Northern branch rises in the Cerro San Francisco, and the Southern one at the

top of the Quebrada de la Troya; it enters the plain near Anillaco and San José, runs to the South as far as the Cerro Negro, then doubles to the East and receives the waters of the river Sauce, which descends from the Sierra of Velasco.

The second, whose name is Vermejo-Chico, * is formed by the rivers Jagüé and Jachal; these two branches rise in the narrow valleys of the table-land of the Cordilleras, the Jagüé from the Cerro-Bonete, and the Jachal — which at first bears the name of Blanco — from the Volcano of Copiapó. The springs of the latter, burst forth in magnificent pastures situated at the foot of this snow-covered peak. These two rivers run to the South, and by and by leave the narrow valleys which are situated between the table-land and the chains that are its appendages, and they do not meet except in 30° Lat. Before this confluence the Jagüé receives the waters of the Loro, and lower down those of the Arroyo-Blanco, and of some others which descend from the neighbouring hills. Near the village of Jachal, the Blanco cuts through the half of the chain of the Cordilleran table-land, and near the village Magna cuts through the other half also. By and by, it approximates the Vermejo-Chico to which it unites lower down near the Sierra of Pié de Palo, then taking the name of Zanjón or Jachal river. It afterwards runs to the South towards the lagune of Guanacache, where, however, it does not reach, because it is lost in the sands. Only in rainy years it carries a small portion of water to this lagune.

The third River of the system of Cordilleras is the San Juan river, which rises in the ravines and valleys situated between the two last summits of the Cordilleras. In the region to the North of Aconcagua it still has two branches; the one, North, called Castaño, and the other, South, called Los Patos. They are formed by numerous streams which fall from the high Western ridge of the Cordilleras by the Eastern water-shed, and flow together near the old Indian village of Calingasta, where the San Juan is formed. This river flows to the East, cuts through the accessorial chain of the Cordilleras which interrupts its course, and on the East of the city of its name, it deviates to the South, and empties into the lagune of Guanacache which receives from it the greatest part of its waters.

The river Mendoza is the fourth river of this system. It has less water and rises by two short branches in the Eastern slope of the Western summit of the Cordilleras; the Northern branch descends from Aconcagua under the name of Las Cuevas river, a confluent bears the name of Los Horcones. The Southern branch

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* Not identical with the Vermejo which empties into the river Paraguay, after crossing the Gran-Chaco.

receives its waters from Tupungato, and therefore is called after that peak. After the junction of these two branches, the river runs to the South by the valley between the Sierra de Uspallata and the Cordilleras, and reaches the level near Lujan. Shortly after it doubles towards the North, in this way arriving at the lagune of Guanacache, where it empties.

Two other rivers follow these previous two, and much resemble them. The fifth, like that of Mendoza, is called the Tunuyan; it rises in two short branches to the North and the South of the valley, situated between the two summits of the Cordilleras on the South of Tupungato and on the North of Maipo; near Malacodor, it enters the plains receiving in the neighbourhood of Totoral the waters of the San Carlos, which descend the Eastern slopes of the Eastern chain. Some Northern streams also empty in to it, as, viz. the Claro, all of them forming a single river which running towards the North and the river Mendoza, never meets the latter, because it deviates later on to the S.E. and empties into the lagune of Bebedero.

The sixth and last river of this system resembles the San Juan. It is formed from two streamlets which come from the Cordilleras; the Northern is the Diamante, and the Southern the Latuel; they join in the plain near the foot of the Cordilleras, and thence as a single river run on and empty into the Bebedero. It appears, however, that on the course of this River it divides into several branches, one of which runs to the S.E. and unites with the outlet of Bebedero, which in rainy years it is said, communicates with the Colorado river.

The laguna of Guanacache has a similar outlet in the Desaguadero river, which is deep and runs to the South, together with the last mentioned rivers of the central system; like them it also dies in the Bebedero.

The small rivers and streams of the Northern part of Catamarca ought also to be considered as belonging to the system of the Cordilleras. They do not come from them directly, but rather from their promontories, and have the same character as the others, disappearing in the sand the same as all the rivers of the Cordilleran system. Among these we enumerate the rivers Catamarca, Belen, Fuerte, etc.

The fourth fluvial system of the Republic is formed by a certain number of small rivers on the South of the Province of Buenos-Aires, which flow from the Sierras de la Pampa, for which reason we have denominated it the "System of the Pampa." Almost all of them—certainly the largest—empty directly into the Ocean, but they carry little water, and none of them are navigable. The most important of them all is the Salado—called "of the South," to distinguish it from the other of the same

name—which runs parallel to the Plata, and empties into the Bay of Samborombon. It receives its waters from some small lakes situated on the Western frontier of this Province in about 62 deg. W. Long. Green. and 34 deg. S. Lat. These lakes appear in a flat which may be considered as a continuation of that on the West, where the River Quinto disappears, without, however, there being any communication between them. The Salado of the South is rich in fish, and its bed at certain points is full of acuatic plants, having been deeply excavated in the soil of the Pampa. During its course a few insignificant streams join it as confluents. The other Pampean streams are much shorter, inasmuch as the longest does not exceed 25 or 30 leagues, whilst the length of the preceding in a straight line is not less than 60 leagues. Some of them come down from the Sierra del Tandil, and the remainder from the Sierra de la Ventana. The former, from the Northern slope, are generally very weak; they run towards the Salado of the South, but never reach it being absorbed and evaporated on the way. On the East, the Second empty into the ocean, or the Mar-Chiquita of Buenos-Aires. Those on the South of the Sierra del Tandil are more important, and principally reach the Ocean. The Quequen-Grande river, founded more to the S.W., is the most important of them all. Between this and Bahia-Blanca some streams empty into the Ocean; they have but little water, because they rise in the plain. We now come to those streams which originate in the Sierra de la Ventana, and which have more water. They are four in number, two of which rise in the Eastern branch of the central portion of the Sierra, and are called Sauce-Grande and Quequen-Salado. The other two, the Naposta and the Sauce-Chico, rise in the principal peak of the Sierra; they are abundant in water, and empty directly into the Ocean before arriving at Bahia-Blanca.

The fifth and last fluvial system we have called the "Patagonian," and its rivers descend from the Cordilleras and pour their wealth directly into the Atlantic Ocean. They are navigable for at least one-half of their course, and the largest ones still farther; their sources are as yet but little—or not at all—known, therefore we are unable to give a more detailed description of them.

The five principal ones are named as follows:—

The Colorado river, which rises between 34° and 35° Lat., and reaches the Ocean in about 40°.

The Negro, whose sources embrace a great extension of country, between 36° and 41° Latitud, is the most copious in water of all the Patagonian rivers. It empties into the Ocean in 41° Lat.

The Chubut, which rises between 43° and 45° Lat., and empties into the Ocean in 44° 50' Lat.

The Deseado, or Puerto, which rises, it is said, in a great lake at the foot of the Cordilleras, called Cologuape, empties into the Ocean in 47° 45' Lat.

The Santa-Cruz river, which appears to rise in some lakes at the foot of the Cordilleras, is abundant in waters, and navigable throughout a great distance for small boats. Its mouth is in 50° S. Lat. At this same point is a colony or fort of the National Government, where wheat of an excellent quality is produced.

CHAPTER VI.

THE GEOLOGY OF THE ARGENTINE REPUBLIC. *

THE geological composition of the Argentine Republic is exceedingly simple owing to the extent of its elements. The greater part of the country is composed of an extended plain called the *Pampa*, which in the Eastern part is hardly elevated above the level of the neighbouring Ocean. In the N.W. the soil is rather more elevated, so that near the city of Córdoba — more or less the center of the country — its hight is 400 metres, whilst on the Western limits in the provinces of Mendoza, Rioja, and Catamarca, is from 700 to 1000 metres in elevation. Although this increase in hight is in general, quite regular, it is broken by some great and level flats which by and by, we will recognize as the seats of the salt deposits.

This plain is bounded on the West by the Cordilleras, which rise almost suddenly from the level to the region of eternal snows, and their peaks contain the sources of the rivers which descend, gullying the mountain slopes, with their waters to the Atlantic and Pacific Oceans.

The Pampa is limited on the North by the Southern edges of the Bolivian table-land, which directly communicates with the Cordilleras: nevertheless, this Northern limit is not — like the Western — a gigantic wall of rock, because the table-land on the South is converted into numerous chains of hills which appear as isolated crests, advancing considerably upon the Pampa in a direction from North to South. The Cordilleras of Catamarca have originated similar chains. The farther these ramifications of the principal mountains extend to the South, so much the more do they diminish in hight, losing their regularity, and thus becoming converted into a series of rocky islets of oblong form, from North

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to South. These oblong mountains surrounded in all directions by the Pampa, particularly characterize the provinces of Catamarca, Rioja, Córdoba and San Luis.

Consequently, the characteristic elements of the configuration of the country are the plains, the isolated mountains — Pampean-Sierras — and the Cordilleras. We have preserved this division in the following pages, because it corresponds to the important variations of the Geology of the Republic.

Pampean Sierras.

Following the direction from West to East, the *Sierra of Piépalo* — in San Juan — belongs to this group; so also, the *Sierra of Famatina*, with its branch the *Sierras de la Huerta*, and *Gualampaja*, which probably communicates on the North with the Bolivian table-land, and on the South disappears in the series of isolated mountains of the *Sierra* of *Rioja*, of the *Llanos* and of *Ullape:* to these we add the *Sierra* of *Tucumán* and *Catamarca*, of which the *Sierra* of *Córdoba* may be considered as an isolated Southern continuation. On account of their geological similarity we ought to add the *Sierras del Tandil* and *Ventana* to these, although they are situated much farther to the South-East in the Province of Buenos-Aires.

These "Sierras" for the most part are chains of rocky mountains. which are generally found parallel to the Cordilleras. They are commonly characterized by gentle slopes towards the East, whilst on the West they are almost precipitously steep like a wall. Their tops which exceed the surrounding plains by hights ranging from 1200 to more than 2000 metres, are composed of table-lands more or less extensive, which rarely rise to the limit of perpetual snow, although *Aconquija* is 5300 m., and *Nevado* of *Famatina* 6024 m. high.

The essential element of all these mountains is crystalline schist, above all gneiss, and—particularly on the North—mica-schist. Various other minerals are added to these, such as hornblendic schist, schistous gabbro, and the granulated crystalline lime-stone, which are presented in quite extensive strata of very variegated gneiss, or else alternate with it in layers of less thickness. Slate is quite rare (Sierras of Tucumán, Córdoba and San Luis).

The direction of the stratification — or of the layers — generally corresponds to the principal direction of the mountains — North to South — its inclination being very steep, or perpendicular. Con-

sequently we do not stretch the truth in considering this schistose formation as Laurentian, taking into account that it is in intimate relation with the old crystalline schistose formation, which takes so large a part in the elements which compose the coasts and the interior of Brazil.

This old formation as we shall see by and by, rarely presents itself in the Cordilleras, but on the contrary, on the Western side up and down the Pacific Ocean, it forms the Cordillera of the coast. As details on petragraphy do not correspond to the object of this work, we will limit ourselves here to some details upon the granulated-crystaline-limestone or marble, already mentioned, which presents itself in abundance, above all in the Sierras of *Córdoba*, *Huerta*, and *Pié-palo*. In the province of Córdoba it has already originated a flourishing industry, because of its white, rose, and green color like serpentine, as well as because it has a homogeneous structure, especially fit for the manufacture of ornaments, and for architecture, whilst its extraordinary purity recommends it for the preparation of an excellent species of cement. The marble of Córdoba already begins to compete with Italian marble which is imported to this country in great quantities. It is, moreover, very interesting in a scientific point of view, because, in various places—especially where it touches the hombleudic schist — it contains many other minerals, of which we will only mention the spinelle, the garnet, the chondodrite, the wollastonite, the titanite, etc.

In the second place, granite also takes part in the formation of the Pampean Sierras. It composes great insular masses in the Sierras of *Tucumán*, of the *Capillitas*, of *Famatina*, *Córdoba*, and of *San Luis*, under the aspect of a regularly granulated and porphyritic rock of common feldspar. In some of these places it has produced a more or less considerable metamorphosis of the Laurentian schist which surrounds it. The Stanrolite-rich slate of *Tafi* and the dichroitic gneiss of *Santa Maria* — Tucumán — belong to this zone of contact.

In the ordinary granite of the Sierras of *Córdoba*, and *San Luis*, numerous layers of pegmatite are present, which, on account of the predominance of quartz are very frequently converted into quartz rocks ; these, visible from afar, tower like white-crests, above their surroundings, which are more exposed to decomposition. These quartzose masses are also of high importance to science, should they be considered as the mother rock of the minerals Columbite, Wolfram, Beryl — sometimes under the form of crystals of an extraordinary weight — apatite, garnet and triplite — as sometimes in such considerable quantities that it appears to me their industrial application would be possible. Therefore, these masses of quartz and of feldspar

will become a material of price as soon as an industry is developed.

The Kaolin, which it is said, is found in various points of the province of Salta, is probably nothing else than these masses of pegmatite fully decomposed.

Finally, we meet in the Pampean Sierras with numerous strata of quartziferous porphyry and eruptive wells of recent date; viz. quartziferous porphyry in the Sierras of *Famatina*, in that of *Belen* and that of *Córdoba;* trachyte and basalt sometimes associated with stratified tufa in the same Sierras, as also in those of *Capillitas* and *San Luis*.

These trachytes are detached as mountains of a conical — or bell-shape, and greatly contribute to the picturesque chains of these regions. Yet none of these eruptive rocks of recent date, reach great dimensions in the different Pampean Sierras — excepting always the quartzose porphyries of the *Famatina* chain — and they may be considered in general, as dispersed precursors of the great centres of the eruption of these trachytes and porphyries of the Cordilleras.

Nevertheless these isolated branches of the Pampean Sierras possess great practical importance, because at various points they contain metalliferous veins with gold, silver, copper, and lead in great quantities; and, as we will demonstrate farther on, they have produced a mining business particularly in the mountains of Catamarca, Rioja, Córdoba and San Luis, of great importance to the country.

Comparing the preceding observations with the known geological analogies of South America, the result is, that the Laurentian schist-Formation ought to be considered as the general base of the whole continent.

Yet it does not present itself in the Argentine Republic with the constant development known in the Guianas or in Brazil. Here, its surface is broken up in the form of great-waves which run from North to South, these same waves — the Pampean Sierras — being alone accessible to our studies, whilst the depressions which separate them are full of sedimentary deposits of diverse epochs. Respecting the last, we limit ourselves to the following remarks:—

On the edges of the greater part of the Pampean Sierras there generally extends a more or less regular inner-margin of conglomerates and sandstone, which soon disappears under the argillo-arenaceous formation of the Pampa. Consequently we may suppose that the Pampean Formation does not rest upon these old schists, but that the subterranean depressions or basins, formed by them, are filled to a considerable hight with sedimentary rocks older than the Pampa. We shall see that this fact is

of the greatest importance in resolving the question whether stone, or fossil coal, exists in the Argentine Republic.

The Cordilleras form the Western limit of the Republic from 22° or 20° S. Lat. On the North, down to 32°, they have the form of a wide table-land of some 4,000 metres in hight, which is even exceeded some 2,000 metres more, by some isolated peaks. Towards the South the table-land grows narrower, and finally, becoming converted into a ridge which gradually diminishes in hight, it extends to the extreme Southern verge of the Continent.

Our knowledge of the geological structure of these mountains, is as yet very rudimentary; we are only acquainted with some profiles, and these, in reduced number, are dispersed a great distance one from the other. Nevertheless, it appears that the grotesque uniformity which other parts of the South American continent present, also extensively prevails in the Cordilleras.

As yet the information we possess respecting that part of the Cordilleras which corresponds to the Argentine Republic, is limited to the zones situated between the 32° and 34°, and between the 27° and 28° of Latitude. In the following considerations we rest upon the first part, *i.e.*, the Cordilleras of San Juan and Mendoza, because the deep and transversal vallies of the South, enable us to make more exact observations than those we can take upon the uniform table-lands of the North.

In a geological sense these Cordilleras, from 27° to 33°, have a central axis of granite which may be regular, but it is more probable that it consists of various insular masses, one succeeding the other, in the direction of from North to South. Around this axis of granite a stratum of gneiss and schist is adapted, whose existence is of great scientific importance, because it indicates to us that the Laurentian Formation, so intense to the West, and particularly to the East of the Cordilleras, has also taken part in the construction of these mountains.

This central axis, formed of crystalline rocks, has been perforated later on, by quartzose porphyry, and these eruptions have been verified in such a colossal manner, within, and on the sides of the central axis, that the quartzose porphyry occupies a much more considerable space than the granite itself. This fact is unquestionable, at least in the part comprehended between 26 deg. and 35 deg. The quartzose porphyry is always characterised by a cryptocrystalline or compact matrix, in which crystals, more or less numerous of quartz and of orthoclase are found. To these substances we must also add here the crystals of oligoclase, or scales of mica. From this circumstance, as well as from the color of the mother-mass and its equal or fluoric, concretional or brecciated structure, an extraordinary quantity of varieties for the transitions

and formations of tufa, is presented. Thanks to these circumstances, the manner in which one of those varieties presents itself in the form of a thin-vein in the mass of another variety, can be observed with sufficient clearness in various points, and this fact is so much the more important because it authorizes us to conclude, that the eruption of quartzose porphyry did not take place suddenly, but, on the contrary, that divers porphyritic eruptions in a certain geological period, have succeeded each other.

We cannot do less than remark here, that, by virtue of some facts which we will communicate later on, this period of the quartzy porphyritic eruptions must have been verified during the interval between the Silurian and Jurassic periods.

The trachyte is a third eruptive formation which has principally contributed—or at least a great deal—to the formation of the Cordilleras. This is particularly found to the West of the granite and of the quartzose porphyries, and constitutes over a considerable zone all the Western slope for 3,000 metres in breadth, as also the mountainous edge of the Cordilleras in Chilean territory. To the East of the granite axis of the Cordilleras; viz. on the Argentine side, trachitic eruptions have taken place at divers points, but always with less energy; we have already recognised them in the form of masses and isolated dikes in the Sierras of the Pampa; these appear more or less, like advanced sentinels driven towards the East, by the general head-quarters of the eruptions.

The trachytic formation of the Cordilleras principally consists of tufa and flecked brecchia, stratified in thick beds of numerous layers and veins of trachytes and andesites, infinitely varied and modified in the petragraphic sense; these last have newly perforated the tufa, or the oldest neighbouring rocks.

The igneous rocks, of recent date in the Cordilleras, belong to the volcanoes in actual activity, which activity can be considered as a tardy action of the trachytic eruptions. We will not touch upon them here, because they are all in Chilean territory; at least, we do not know to the present, a single active volcano in Argentine territory.

On account of the conciseness of this article, we have considered in the preceding lines, the quadruple activity which has contributed to the formation of the Cordilleras, the results of which form their principal substance between the 31 deg. and 33 deg. Lat., as a single action; nevertheless, we must acknowledge intervals in the action of the subterranean forces, between the different epochs of the granitic eruptions, and those of the quartzose porphyries, as also, between these and the trachytes. We can demonstrate with the greatest exactitude, that during these intervals the second producing element of the rocks — the water — has efficaciously contributed to the formation of the

the Cordilleras, with more or less thick deposits of sediment. Although with the march of time, little by little, the Cordilleras have been converted into the gigantic mountains which we now contemplate, in the primitive geological periods they were nothing more than a small ridge, which the neighbouring ocean inundated at various points, depositing its sediment on the slopes or on the crests.

We prefer to examine these marine formations of the Cordilleras, relatively with those which have been verified in the rest of the Argentine territory, and to follow a chronological order in our examination. Consequently we will begin by a description of the most ancient, and terminate by that of the most recent, marine-formations.

Sedimentary Formations of the Argentine Republic.

The arenaceous and conglomerate formations are those most generally found in our territory, and, excluding the sandy-clay of the Pampa, they have probably a much greater extension than can be directly demonstrated. The sandstone is regularly found in the form of narrow edges around the greater part of the Pampean Sierras, but it sometimes also enters into its mass under the form of perforations, or it is placed as the remains of a general ancient stratum on the top of these Sierras. Finally, it is met with of extraordinary thickness along the whole Argentine border of the Cordilleras, up to the greatest hights.

Long since, similar arenaceous formations were known in the Cordilleras of Peru, Bolivia, and Chile, as also in the interior of Brazil, but the exact determination of the geological horizon it belongs to, is yet one of the most difficult problems; above all, because fossils have been rarely discovered in this rock, and they are indispensable to its determination. Notwithstanding this, we find opinions emitted about the period of these formations in various writings upon the geology of South America, which are based only upon the petrean character of the sedimentary rocks; but these opinions can have no other value than that of a completely chimerical hypothesis.

A few years ago, only a small number of important data existed upon Chile, Columbia, Venezuela, and Brazil; but to-day—thanks to the interest which the Argentine Government has awakened for the scientific exploration of this country, the obscur-

ity—which to the present time covered the Eastern portion of the Cordilleras—commences to disappear.

Discoveries of great value have been made in various places; the most important of all permits us to recognise, that the sedimentary rocks of the Republic belong to five completely distinct, geological horizons.

In the following lines we will communicate the most interesting results of these investigations:—

I. Silurian and Cambrian Formations.

It has long since been known that the Paleozoic soils of the Cordilleras of Peru and of the Bolivian table-land, are very thick, since it is well understood they are also found in the Falkland Islands. It has been observed during the last years that they are likewise very thick in the mountains at the North of the Argentine Republic, which, as the margin of the Cordilleras, bound on Bolivia and the West of the country.

Yellow and brown sandstones, and greyish-green calciferous rock, with numerous remains of the primary Fauna, have been collected in *Tilcuya*, to the N.E. of *Javí*, in the Province of Jujui, and in various localities of the Province of Salta, very near to its capital, as also in the *Nevado of Castillo*.

Some arenaceous strata are completely covered with a species of *Agnostus*, with the remains of great *Trilobites* and of *Brachiopoda*. This fact enables us to definitively assert that the Cambrian Formation is very much developed in the Provinces of the North. Respecting the Provinces of San Juan and Mendoza, the Cordilleras between 30 deg. and 33 deg. have two promontories on the Argentine side, which run along in a regular parallel line, and disappear little by little. The first, which is the nearest to the axis of granite and quartzose porphyry of the Cordilleras, consists of argillaceous-schist, sometimes alternating with greenish-grey sandstone, composed of fine grains—*Graywacke*—in the petragraphic sense. Up to the present nothing has been found in this, save some indeterminate impressions of plants, and on this account we can only suppose—relying upon the reciprocal relations between the stratification and the calciferous rock which we have already mentioned—that the argillaceous-schist—slate—and the *Graywacke*, are the equivalents of the Cambrian Formation of Salta and Jujui.

The central part of the *Sierra of Mendoza*, of the *Sierra del Paranillo*, of *Uspallata*, and of *Portal* which crosses the province of San Juan, belong to this series, and for this reason, could be called the "primary anti-Cordilleras."

The slates which form the Northern part of the *Famatina* chain —the *Cerro Negro* and the *Cerro of Famatina*—also probably belong to this same level.

Directly to the East of these "primary anti-Cordilleras," and parallel to the real Cordilleras, various deeply-seamed mountains spread out in the provinces of San Juan and Mendoza, which are almost exclusively composed of compact limestone and dolomite; and in the province of Rioja, at the Eastern foot of the chain of *Famatina*, of schists, and calcareous and arenaceous rocks.

Fossils in an excellent state of preservation have been found in six different localities, situated on a line which extends for 30 geographical leagues from North to South; viz.: *Trilobites, Orthocerata, Lituites*, a species of *Maclurea*—in great quantity,—and various *Brachiapoda-Orthocerata, Spirifers, Rhynchonella.*— All these fossils demonstrate that these strata are situated upon the inferior Silurian Formation, and they present moreover, the surprising result, that the Argento-Silurian Fauna, appears much more similar to the Scandinavo-Russo-Silurian Fauna, than to that of North America.

The Sierras of *Zonda*, of *Villicum*, *Gualilan*, *Huaco*, and of *Jachal*, all situated to the West and N. West of San Juan, almost generally consist of these inferior Silurian strata, so that all these mountains can be comprehended under the general denomination of "secondary anti-Cordilleras."

Should these investigations be continued, it would probably be demonstrated that these lands are also found along the Cordilleras of Rioja and Catamarca; therefore, we believe it worthy of mention, that in the great centre of the ancient crystalline schists—that is to say, in the territory of the Pampean Sierras—as yet no sign has been found of these Formations. It therefore appears, that this geological distribution in the Argentine Republic, represents the Eastern limit—or rather the Eastern shore—of the ancient Silurian Ocean. If this be so, the continuation of the Silurian Formation should be looked for on the other side of the Cordilleras, in Chile; and in effect, we possess some information which fortifies this supposition.

II. The Rhetian Formation.

In the extreme South, and to the S. W. of the *Sierra de la Huerta* in San Juan, the conglomerates and sand-stones—whose strata dipping to the West, soon disappear under the arenaceous clay of the Pampa—unite with the ancient crystalline-schists which form this Sierra. The stones of the conglomerates consist of quartz, gneiss, hornblende-schist, and other crystalline-schists which are

also found in the neighbouring mountains. Nevertheless, the exact determination of the period would be impossible, were it not that in the point named *los Marayos*, the sandstone alternates with argillaceous-schists, and with some thin layers of coal, in which some remains of fossil-plants are found very well preserved. The study of these plants has taught us that they appear much like those of the Flora of the Rhaetian strata, thus by this fact, demonstrating for the first time, the presence of a Mesozoic Formation in the Interior of the Argentine Republic. Later on, we will have occasion to enter into some practical details respecting the layers of coal which they contain. At present, we limit ourselves to record, that the minute study of this carboniferous-formation, as well as of its extension, is one of the most important problems which the Republic can propose to its geologists.

III. Liasic and Jurassic Formations.

Whilst it has been lately demonstrated that the Eastern anti-Cordilleras consist of palaeozoic lands, it has been long known that a series of Liasic and Jurassic strata are found in the Western, or Chilean, slopes of the Cordilleras, and according to these observations, these strata are regularly presented, above all between 25° and 42° of latitude. Inasmuch as the geological axis of the Cordilleras does not correspond to this marine separation between the Atlantic and the Pacific—that is to say, to the boundary between the Argentine Republic and Chile—but is found somewhat more to the East, the Jurassic Formation is not found in Argentine territory, except in certain places: for example, in the *Cordillera of Mendoza*, at the *Puente del Inca*, and in the *Cordilleras de los Patos*, in *Espinacito* San Juan. In these two localities the Jurassic Formation is strongly developed, and particularly so in the last; the strata being full of characteristic fossils, such as *Belemnites*, *Ammonites*, *Trygons*, *Asterias*, *Ostraceans*, *Rhyncholites*, *Terebratulites* and *Spirifers*. These fossils are found in conglomerates, or in calciferous or arenaceous marls, and certainly it is not superfluous to record here, that in *Espinacito* the stones of ammonite-conglomerates almost exclusively consist of quartzose porphyry. This fact positively indicates to us, that the Jurassic sediments have been deposited after the eruptions of quartzose porphyry. The trachytes and basalts on the contrary—whose eruption took place in a much more recent period—the Tertiary—have perforated the Jurassic lands, and in certain places —above all at the *Puente del Inca*—changed the compact Jurassic limestones into marble.

Inasmuch as the Jurassic strata do not seem to appear anywhere

to the Eastward beyond the Cordilleras, we infer that the granites and quartzose porphyries belonging to them, formed a chain of probably-low mountains even in the Jurassic period; and this opinion about the shores of the Jurassic Ocean is the more strengthened when we recall the existence—already mentioned—of the Rhaetian-carbons in the province of San Juan, to the East of the Cordilleras. This fact demonstrates that a continent covered with vegetation to the East of the Cordilleras, existed immediately prior to the Liasic period.

IV. The Tertiary Formation.

Strata of a cretaceous-formation are as yet entirely unknown in the La Plata territory, but, on the contrary, the Tertiary Formation is found to be extensively developed, and, in many places, under a characteristic aspect. This is observed most distinctly in the province of Entre-Rios, in banks of some 30 metres in hight, on the shores of the river Paraná near the city of that name. Here we find alternate layers of sand, sand-stone, limestone and marl, which contain numerous characteristic fossils in a state of perfect preservation. Above all, a species of the genus Oyster—*O. Patagonica*—calls attention on account of its abundance; in the banks to the North of the city it exists by thousands. Moreover, —above all in the arenaceous layers of the port—the various species of *Pecten*, of *Arca* and of *Venus*, would not be sought in vain. In various localities the teeth of the shark and the *Myliobates* are found, as also, although rarely, the teeth and bones of the *Toxodon*, *Paleotherium* and *Anaplotherium*. These last, remains of the first mammifers which peopled South America, as also the fact that strata of marl with bivalves of fresh-water in marine-sediments, are found at certain points, indicate that in the neighbourhood of the city of Paraná, a highly populated coast of the Tertiary period must have existed.

In a technical point of view we ought to mention here, that the Tertiary limestones give occupation to many kilns whose products are disposed of in great abundance along the river.

The Tertiary Formation can be followed from Entre-Rios towards the South, across *Bahia-Blanca* and the mouth of the river *Negro*, through the whole Patagonian territory to *Point-Arenas*, in the Straits of *Magallanes*. Strata are always found at these points, with fossils similar to those we have seen in Paraná. On the opposite-side, the ridge appears to extend to the West and N. West as far as the Cordilleras and Bolivia.

Near *San José* in the valley of *Santa Maria*--Catamarca—many bivalve fossils are found in the sandstone, to which conglom-

erates are often joined, whose pebbles in greater part originated in the ancient crystalline schists, and also in the hornblendic andesites and lavas of the Trachytic Formation; only on this account can they be recognized as belonging to the Tertiary group. Their special relation—respecting their age—to the Tertiary strata of Paraná, cannot be determined until we possess from Catamarca also, a more complete collection of fossils than that which yet exists.

The observations which have been made in Catamarca, and San Juan, demonstrate at all events, that the Tertiary Formation has a great extent; various circumstances authorize us to suppose that the greater part of the sandstones distributed throughout the Interior of the country, belongs to this period. We mention here *en passant*, that thick layers of chalk are found in these sandstones at several points: for instance, in the *Sierra of Tucumán*, and in the province of Rioja, near *los Angeles*. Nevertheless, the thickest stratum is found in the Cordilleras of Mendoza and San Juan, where—as in *Valle Hermoso*—several mountains are found exclusively of chalk.

V. Pampean Formation; *(Diluviana)*.

Over all the Argentine plains which are situated between the Atlantic Ocean and the Eastern slopes of the Cordilleras, a stratum of clay, generally called "the Pampean formation," after D'Orbigny, extends almost without interruption over all the Argentine plains, which are situated between the Atlantic Ocean and the Eastern slopes of the Cordilleras. The surface of this plain extends over thousands of square leagues, whilst its thickness reaches some 20 ms., as may be seen in the excavations made by the rivers, and in the construction of wells. Where the Pampean Formation is found completely stripped, it consists of a yellowish, or reddish, calciferous-clay, and only in the vicinity of the mountains does it appear as the base of the strata of sandstone and pebbles, which in the character of hydrophanous layers, are so important in the perforation of wells. These petrean-strata, which were discovered during the construction of the railroad from Córdoba to Calera *, help our studies in an extraordinary manner, although they are also found in the Provinces of Mendoza and Tucumán. The lime, as a general rule intimately mixed with the Pampean-clay, has become concentrated into pieces of greater or less size, or has formed thin-layers, thus giving origin to a formation which is generally denominated *tosca*, or rather, water-lime. Near Rosario the river Paraná has abraded its banks, loosening pieces of this

* A village situated near Córdoba, at the foot the Sierra, where several lime-kilns are worked.

tosca, and afterwards depositing them at various points, were they are now used with good result for the manufacture of hydraulic cement.

We ought, moreover, to mention the existence of some fossils which have been found in quite great quantities, not only as isolated bones, but also, as more or less complete skeletons of extinct mammifers; above all, the *Mastodon*, *Megatherium*, *Mylodon*, *Glyptodon*, and *Toxodon*. Magnificent skeletons exhumed from their very ancient tombs now constitute the chief ornaments of the Museum of Buenos-Aires. Up to the present, no other organic remains have been found in the clay of the Pampa, but the fossils mentioned are, nevertheless, sufficient to demonstrate that the formation of the Pampa corresponds to the Diluvian-formation of North America and Europe.

There are reasons for the opinion that in the epoch of the gigantic *Glyptodon*, the level coasts of the Atlantic Ocean were much farther in the Interior than at present, and that the sea had communication with the great lakes, in which then already, the Pampean Sierras were rising like a series of elongated islands. The products of the decomposition of these mountains carried down by the rivers, originated the formation of this clay at the bottom of the sea and of the lakes, doubtless the principal element in the formation of the Pampa being brought from the sources of the Plata, that is to say, from the regions of gneiss and granite in the centre of Brazil; because in these regions, a tropical climate prevailed during the Tertiary period, which occasioned this energic decomposition of the ancient crystalline-rocks into arenaceous-clay, as can yet be distinctly observed in the Brazilian Provinces of Rio de Janeiro and Minas-Geráes.

VI. Alluvial Formations.

After the formation of the diluvial-clay of the Pampa, a new elevation took place in Argentine territory at various points of the shore, up to the environs of Rosario, and to a hight of several metres above actual sea-level; this is understood from the fact of finding banks of sea-shells, which could only have existed in salt-water. Consequently, when the Diluvian period terminated, the coast of the sea was much farther inside of its present line, and its advance to the East could not have been caused otherwise, than by a post-diluvian upheaving. The great diluvian lakes that existed between the Pampean Sierras, were then separated from the sea, and drying up, thus originated the division of the land and water, and the hydrographic system which actually exists. The deposits of water-worn gravel which exist in

the Pampa-clay near the mountains; the mass of sand with its moveable hills, called *Medanos*; the great plains of the centre, and also the salt deposits; are Formations of the last period of formation of the Argentine Republic.

We ought to record the following respecting the salt-beds. The plain covered with Pampean clay, as we have formerly said, rises to the West, but this elevation is sometimes interrupted by depressions. Thus, for example, whilst the Pampa, on the Eastern edge of the Sierra of Córdoba, reaches a hight of 400 metres, to the West of this chain of mountains, it is depressed to 160 metres, again rising further Westward, to the former hight. In these depressions—like that one situated to the Westward of the Sierras of Catamarca and of Córdoba, from 28° to 32° Lat.—a plain is found of some 100 square geographical leagues, where the most extensive salt-deposit of the country exists. Smaller ones are found in divers hollows of the Pampa under the same circumstances. These salt-beds, or salt-lands, are almost entirely destitute of vegetation, and present different aspects according to the seasons. During the dry months the argillaceous-soil is hard, and shows an efflorescence which forms a layer of salt some millimetres thick, so that at first sight, it appears like a field covered with snow extending to the horizon.

The delicate crystalline-crust principally consists of chloride of sodium, sulphate of magnesia, and sulphate of lime. In the rainy season this crust disappears, the dissolved salts penetrate the clay, and reunite with the waters at the lowest points, forming very-salty small lakes. These, again, dry up in the winter, the salts crystallize, and the different species separate themselves in a very characteristic manner. The sulphates concentrate at the edges of the lakes, and the chloride of sodium is collected. in the centre, forming quite-solid beds, which are worked for the use of the surrounding towns and villages.

The origin of these salt-deposits is not yet sufficiently explained Either they are the remains of salt-lakes which in the alluvial period covered the low land of the Pampa, or else they are produced by the extraction and dissolution of the deposits of salt, which are found in the sedimentary formations of the Pampean Sierras, and which, little by little, have been brought down by the rivers that rise in these mountains. As the greater part of the rivers are very salty, and as also salt-deposits are found even on the high-levels of the Cordilleras, where, of course, in the Diluvial period the waters of the sea could not reach, the second hypothesis—at least for the greater part of these deposits—is the most probable.

CHAPTER VII.

ON THE VEGETATION OF THE ARGENTINE REPUBLIC. *

SOME years ago few countries were less known—particularly respecting their natural productions—than the Argentine Republic. On this account its enlightened Government determined to bring scientific men from Europe, to teach the natural sciences to the studious Argentine youth, a knowledge of which would powerfully contribute to the development of the country. But the mission of the learned men was even yet more elevated, as they were informed that one of their principal duties would be the study of the natural conditions of the Republic, so as to facilitate—according to the proverb "knowledge is power"—the creation of domestic wealth, and thereafter, publish their discoveries to the world. In this way immigration and population would be greatly advanced, and science would have its place in the Argentine Republic, in noble competition with the neighboring States of Brazil and Chile, which already, for many years, had favored the scientific exploration of their territories.

But the fruit of these difficult studies and investigations cannot be gathered in a day, nor yet in a year, especially when they have been made upon regions hitherto unexplored, and so far distant from the scientific centres and the great libraries and collections of Europe, that only the most indispensable resources can be slowly brought together with many difficulties; and even then, it is often necessary to consult the scientific men of Europe.

The first *systematic* study of the vegetation of this country was made by Dr. Lorentz, who was called from Germany to fill the

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* By Prof. P. G. Lorentz, Sc. Dr.

chair of Botany in the old University of Córdoba. Before his time, amateurs like Bunbury of Buenos-Aires, and Gillies of Mendoza, had made chance investigations and small collections, whilst we find more or less information throughout the works of the travellers Darwin, D'Orbigny, Miers, and Pellegrino Strobel, There are yet other travelers, who on account of their superficial remarks, have caused more harm than good to the knowledge of Argentine vegetation.

Dr. Lorentz was afterwards assisted by another German botanist, Mr. G. Hieronymus, who came from Germany as Botanical assistant to the University of Córdoba. Mr. Hieronymus accompanied him in a long scientific voyage to the North of the Republic, and is at present his successor in the chair of Botany of Córdoba, where he continues his studies indefatigably, whilst the temporary field of labor of Dr. Lorentz is in the Province of Entre-Rios.

The results of this seventeen months' voyage have not yet been studied, therefore they cannot be inserted in this chapter. The same may be said of other collections at present under study, and which will doubtless give results of great importance.

The benefits of having established a scientific centre in the country, are more keenly appreciated day by day; hidden treasures come to light, and new researches are undertaken with the certainty for the collectors, that the collections and results of their studies, will always fall into the hands of competent persons who know how to value them, and render them useful to science.

Collections of great importance made and promised by Messrs. Heusser and Claraz, from the South of Buenos-Aires, will soon arrive, and a magnificent collection sent by Mr. F. Schickendantz, has just been determined by Prof. Hieronymus, although he has published nothing as yet. He is also occupied at present, in determining an interesting collection from Patagonia, made by Prof. Berg and Mr. F. Moreno of Buenos Aires, and is classifying a little collection made in Corrientes and Santa-Fé by Dr. A. Doering, Profesor of Chemistry at the National University of Córdoba. Collections and information have also been promised from Santa-Fé.

The results of these collections will not be found in this sketch, therefore it will be much less complete than would be the case, were it to be written a couple of years hence.

At all events, it appears from what I have said, that the determination of an enlightened Government to endow the country with a scientific centre, has already produced and will continue to produce, excellent fruits to science in general, and to the country in particular.

Although our knowledge as yet may be only superficial, even so, the space at my disposal is too reduced to enable me to

write a more or less detailed relation of our Flora; therefore I must limit myself to a mere outline of the subject.

The Argentine Republic extends from 20° to 55° S. Lat., and from 51° to 73° W. Long. Greenw.

In the direction from North to South, I will first mention the continuation of four territories or regions, which unite with four others more to the North, but which nevertheless, are characterized in our country, by a considerable number of new and interesting species, and by the physiognomy of the vegetation in general.

We find in the Cordilleras and their branches, the district of the *Puna*, which is a continuation of that floral region, which an excellent modern phytogeographer has denominated, the tropical-region of the Andes: this section in our territory, is very characteristic on account of the discovery in it of numerous new species.

The lower part of the Cordilleras and their branches—at least of those which are sufficiently high—is surrounded for the breadth of several leagues, by a rich and splendid zone, to which I give the name Sub-tropical Formation. It is the garden of the Argentine Republic, a region wherein majesty and softness fraternize with an admirable fertility, and excite the enthusiasm of all travelers, as well as surprise the botanist all the more, because it is a country unknown to science hitherto. A third Formation of the North, is that which I call the Formation of the Chaco.

A less magnificent Formation begins at that distance from the Cordilleras, where these peaks cease to manifest their beneficent influence in the condensation of the mists of the Atlantic Ocean, which spread fertility down to the base of the gigantic mountains that crown the panorama. The majestic forests of the mountains diminish, to be replaced by smaller trees and dense—although as yet, rather high—brush-wood; many plants of the warm and moist region disappear in part, to be substituted by others less rich. A considerable number of characteristic species authorizes me to say, that the vegetation of the Chaco is a separate Formation. The continuation of this Formation on the North, its connection with the Northern-Chaco and the vegetation of the Brazilian Province of Matto-Grosso, is a problem—as yet not resolved—in the geography of plants.

On the South where the mountains decrease, and the high-rocks which detain the mists of the sea disappear; there, where an undulated and immense plain restricts the horizon, the Formation of the Puna and the Sub-tropical Formation, are limited by a dry formation of bushes and even of forests, which a great phytogeographer has called "the formation of the Chañar steppe," but which I prefer to call "Monte." It is divided into Western and Eastern parts: farther on, I will describe their peculiarities.

The Formation of the Chaco is limited on the South by the formation of the Pampa; the extent of their contact being as yet unknown for want of investigation, it can only be conjectured from superficial information; moreover, a part is found in the territory of the wild Indians.

The character of the Formation of the Pampa consists in the complete absence of trees and arborets, with few exceptions which I soon will mention, as also, in the predominance of the *Gramineæ* to which is added a vegetation poor enough in species. Nevertheless, the soil is not sterile; the broad and virgin stratum of clay which is its basis, is rich—sometimes very rich—in fertilizing salts, and so long as rain is not wanting, it permits advantageous cultivation.

The importance of this base is at once seen in the Patagonian Formation. Although the latter is not separated from the former by any demarkation of climate or natural limit, there is a notable difference between its brush-wood and the meadows entirely destitute of plants of ligneous-structure, which doubtlessa rises from a modification of the soil. Instead of the clay of the Pampa, we see here plains covered with loose-stones, and this seems to be the principal reason why the Patagonian-arborets here replace the Pampean-meadows.

In the territory nearest to the Straits of Magellan, as also on the Eastern-brow of the Cordilleras which bound this part of the country, a part of the great district which in the phytogeographic science is called the territory of the Antarctic forest, belongs to the Argentine Republic.

If we again direct our attention to the North, we come to the Provinces of Corrientes and Entre-Rios, which join to the Southern frontiers of Paraguay and to the Misiones, which confine on the Southern provinces of Brazil. Notwithstanding the accessibility and fertility of the first two Provinces, and the long residence in them of M. Amedée Bonpland, the vegetation of all of them is one of the least known; also, all we know of the Flora of Paraguay is quite superficial.

It appears that the latter is characterized by a tropical fertility, particularly in respect to the trees, and is allied under divers points of view to the Sub-tropical Formation. Yet, as it appears to have notable differences, and as it is separated locally from the Sub-tropical Formation by long spaces of a different character, I take it as a Formation which I call Paraguayan, and which could also be called South-Brazilian. To this Formation seem to belong the *Misiones*; it is very little known as yet, and is the fourth of those which I have already mentioned, as extending on the North of the Argentine Republic. Its great-trees and sub-tropical forms appear to reach a long distance, like a fringe, down the Western shore of the River Paraná.

In the Provinces of Corrientes and Entre-Rios the great trees disappear, those which exist having neither the hight nor the majesty of those of the region already mentioned. Where sub-tropical forms are found—and they are not wanting—they are lower, and it appears that the greater part of these Provinces are generally covered with meadows, interspersed with some bushy-copses.

The environs of Concepcion del Uruguay is the only locality somewhat better known; the Formation there is composed of some few forms which also exist in the Pampean Formation, and in that which I have denominated the Monte Formation. The number of vegetables belonging to the Sub-tropical Formation is greater, but greater still is the number of species which as yet, have not been observed in the Argentine Republic, and which, without doubt, are common to Paraguay and Brazil; whilst a part may belong only to this region. These are the observations which have induced me to distinguish the vegetation of this Argentine Mesopotamia as a separate Formation, to which I have given the name of "Mesopotamian," including also under this designation the islands of the Plata and Paraná. Although the vegetation of these islands is little known as yet, we still know that some elements exist which are found in the Subtropical Formation, but which are wanting in the Pampas.

The formations mentioned are therefore, the following:—

1. Formation of the Puna.
2. Sub-tropical Formation.
3. Formation of the Chaco.
4. Monte Formation.
5. Formation of the Pampa.
6. Patagonian Formation.
7. Formation of Antarctic Forests.
8. Paraguayan Formation.
9. Mesopotamian Formation.

What I have called here "Formations" are parts of greater unities, called territories or dominions. Most of the "Formations" of the Argentine Republic belong to that territory, which Grisebach calls, territory of the Pampas; others, are parts of territories which extend from neighbouring countries to the Argentine Republic; the highest abstraction which can comprise various formations being a territory or dominion, whilst a Formation may be composed of various regions or zones.

Let us now study separately these Formations, following the list from the bottom, by commencing with the inhospitable territories of the South, to pass thence to the fertile regions of the North.

I. Formation of the Antarctic Forests.

The great humidity and equitable marine-climate have produced magnificent forests on the Western brow of the Andes. This region extends from 34 deg. to 56 deg. Lat., and the Republic of Chile owes to it, the wealth of some of her Provinces—Valdivia, for example.

These forests extend, as already said, to the Straits of Magellan, and even Tierra del Fuego shows the belt of woods, beyond which, at but a small hight above the sea, extends an alpine Flora, corresponding in many respects to the arctic vegetation, losing more and more their characteristic elements, in harmony with the degradation of the climate.

But not only on the water-sheds of the Pacific do these forests show themselves; the Eastern or Patagonian slopes also have forests of beech-trees. It is not yet known where they terminate in the North, but it is supposed at least that they do not reach to 34° as on the other side of the Cordilleras. It is probable that they disappear at the point—about 39°—where the continent begins to broaden, but I know of no observation on the subject.

On account of its broken surface, the terrible tempests which reign there, and the continual and excessive rains, the Southern portion, from the Archipelago de Chonos, is one of the most inhospitable countries of the world, and consequently is unfit either for cultivation or civilisation. A real forest is not found save in the cañons which are protected from the tempests that elsewhere prevent the growth of the trees; on the slopes exposed to their fury—only a few weeds and bushes are found.

According to the reports of travelers, the only trees which exist in this Southern portion—and on the shores of the Straits of Magellan—are beeches, mixed with a *Magnoliacea—Drimys*—which grows there to a considerable hight. The thick underwood, consist of a species of *Berberis*, and other Antarctic species. At the most level places, where the water has no outlet, a thick layer of turf is formed, which is ceaselessly renewed by two coppices, whose shoots, strongly ramified are only a few inches high, and are covered with close and small leaves. A *Saxifragea*, and a species allied to the lillies, are also found here, all of them being accompanied by a reduced number of other plants. At a relatively small hight, an alpine vegetation very similar to the arctic, is observed. Excepting the timber and the turf, the vegetable kingdom produces here, no useful article whatever. Therefore, agriculture has but small probabilities of success. The name of

"Port Famine," explains of itself the results of colonisation. A fungus—*Cyttaria Darwinii*—is found on the trunks of the beech-trees, and serves as an aliment to the indigenes, but to European immigrants it certainly would not be appetitive. Musters found it also, in the most Northerly woods, and says that it is disagreeable and insipid.

Nevertheless, it cannot be denied that the forests of beeches on the Eastern slopes of the Cordilleras could be exploited by an energetic and laborious people; the more so, also, because it is said that forests of pine and wild apple-trees, which constitute the Paradise of the Indians, are found on the upper shores of the river Negro. I do not know any good and detailed description of these regions; Musters visited them, and was agreeably surprised. He speaks of magnificent woods and vines, but his description is too superficial to give us a clear idea of this vegetation.

So long as the savage Patagonian leads a wandering life on the plains of his country, civilisation will not penetrate these primitive forests.

II. Patagonian Formation.

We are also without exact and detailed information in reference to this Formation: the coasts have been described with all precision but the Flora is not known save through isolated communications. Not a single botanist, nor yet a scientific traveler, that I am aware of, has ever penetrated into the Interior.

Messrs. Heuser and Claraz are the best acquainted with this Province, and have made the best description of the Patagonian Flora. For my part, I believe it is better to publish their data here, as it refers to the Colorado and Chubut rivers, from 39°50' to 43°15' Lat. Among other things they say:

"The Patagonian table-land generally presents the aspect, although not mathematically, of a plain more elevated than the Pampas, a peculiarity which attracts travelers from the first moment, on account of the numerous depressions which run through the Patagonian Formation; therefore, the name of table-land is very proper for these regions.

"The vegetation in itself, bears the character of the dry climate. These parts, which on account of their depth—like the valleys above-mentioned — are very fertile, alone present us with true pasturage and a vegetation which recalls the Pampas: such as the *Glumaceae*, of which the most notable is the species called Cortadera—*Gynerium Argenteum* — the Carrizo — *Phalaris* — the Totora—*Typha*—and some true *Gramineae*. The species of

the valleys of the centre of Europe, although different, much resemble these species, and belong to the same genera and the same families. In the valley of the river Negro the American willow, —*Salix Humboldtiana*—is found coasting the river, and forming narrow strips of foliage; it is used for building purposes. Protected from climatic variations this wood is very durable, and exposed—in this dry climate—it lasts from seven to eight years. The only representative of the *Cryptogamia* is the *Equisetum*, which is found everywhere on the shore, and some mosses and rare lichens, which as a rule, are only seen during the winter. This will give an idea of this low and humid alluvium, in which no salts exist. Nevertheless, numerous salt-deposits are found in the valleys, whose description we owe to Mr. Darwin, and which are generally worked near the river Negro: many—SALITRALES—that is to say, saline efflorescences of the soil, also exist here. In these two cases, the vegetation of the valleys is a salt-vegetation, and *Salicornias*, called JUME here, whose ashes contain much soda and are employed nearer to Buenos-Aires in the soap-factories, as also, a woody *Synantherea* called MATORRO, characterize these localities.

"The Flora of the table-land, whose geological formation has been denominated the Patagonian Tertiary, is completely different to that of the humid alluvium already mentioned. Mr. Darwin observes that this Flora is similar to that of Mendoza, being in reality different to that of the properly-called Pampas. The principal difference consists in the fact, that the Pampas are true meadows, in which a few isolated groups of trees are only found alongside of the rivers, whilst the Patagonia Formation is a mixture of herbaceous plants and bushes, among which one or the other may predominate, or all are equally represented. As regards the herbaceous formation it consists essentially of *Gramineæ*, to which in the second place the *Syantherеæ* are united. No turf anywhere exists; the soil is always uncovered between the tufts, which never grow densely together. In winter time, these open spaces are covered by the green leaves of an annual plant called ALFILERILLO — a species of *Erodium* — which is excellent pasturage for sheep. This plant sprouts after every rain, and extends itself more and more, with the increase of the flocks which pasture in it. The ligneous vegetation consists of brush-wood of the hight of man by foot or betimes of a man on horseback, almost all the bushes are thorny and crooked, and they are also characterized by the miserable development of the leaves which are sometimes entirely wanting. The CHAÑAR and its ally, the UÑA DE GATO, the ALGARROBO or the ALGARROBILLO — *Prosopis*; — the MATA DE INCIENSO or MOLLE — *Durana*, — the MATA-CABALLOS and the PIQUILLIN, the MATA-NEGRA the JA-

RILLA, are the commonest species, and together with some woody *Symantheræ*, form the greatest part of the ligneous Flora.

"These plants produce a more or less good fire-wood. The PIQUILLIN is the most appreciated, whilst the MATA-NEGRA contains a gum which in burning exhales a disagreeable odor, that is communicated to the meats whether roasted or boiled; the INCIENSO also contains a resin, which, by combustion, produces the characteristic perfume which has given its name.

"It is proper to mention as well, a coppice which the Indians call ELCUI. The bark contains much wax. The Indians burn the branches of this plant by holding them over a receptacle of water, for the purpose of melting and procuring the resinous-wax which falls drop by drop; they chew it afterwards." Perhaps the ELCUI is identical with the *Oxyoladus aphyllus* of the Western wilderness of the Monte Formation.

"To conclude, we will mention a great quantity of TUNAS—*Cacteae*—which sometimes have thorns two inches long and as hard as iron, that wound terribly the horses not accustomed to these countries. These *Cacteae* are very characteristic plants of the Patagonian table-land. The information which we have now given, contains an essential description of the Flora of this portion of our country."

Farther on, in the same article, these gentlemen give some details of which I do not wish to deprive my readers, and to which I will add some verbal intelligence from Dr. Heusser. The limited space at my disposal prevents the reproduction of more extensive extracts. In the low and humid alluvion, and on the slopes which surround it, both wheat and the vine prosper admirably; above all the viticulture when undertaken with some intelligence not only promises good returns, but, as is well known, has already produced them. The sides of the valleys promise better still, than the damp low-land for the cultivation of the vine. The author of this sketch has never visited these regions, but he cannot cite better authorities than the gentlemen mentioned.

Mr. Musters also mentions the existence of some edible herbs and turnips, but without giving any description, therefore we do not know to what family they belong. At all events they are not sufficiently abundant to support the Indians, notwithstanding their reduced number.

That which the sterile soil—owing to the rude climate—does not produce, is partly compensated as in the Northern hemisphere, in respect to the products of the Ocean. This is the case principally in the animal kingdom. With it I have nothing to do here, but the enormous quantity of *Algæ—Fucus*—found on this coast may become of great importance some day, on account of the value of their ashes in the preparation of Iodine.

On abandoning these inhospitable districts let us turn to the more enchanting regions of the beautiful Argentine Republic.

III. Formation of the Pampa.

This constitutes a complete contrast with the Patagonian Formation, not only in a petragraphic or geological, but also in a botanical, sense. Whilst in the one, this ground is covered with loose stones, in the Pampa we find a soil of yellow-clay more or less mixed with sand, lime, and saline substances; and whilst ligneous and thorny bushes characterize the vegetation of Patagonia, the Flora of the other, with some few local exceptions to be mentioned later on, is completely destitute of indigenous woody plants. The accounts of travelers do not give sufficient details to enable us to determine the limits between the Pampean and Patagonian Formations, or between the woods and pastures; limits which are the more difficult to mark with exactitude, because —according to Dr. Heusser—the transition between these formations is perfectly insensible, the bushes becoming scarcer little by little, until they finally disappear. Nevertheless, we can subordinate our examination of the phytogeographical, to the geological formation—which in truth even in respect to details, ought to be shown—and thus ratify the declaration of D'Orbigny and Darwin, that the River Colorado is the line of demarcation, although at some points, the Formation of the Pampa appears to extend more to the South. I have drawn it on the map which accompanies this treatise, according to the indication of Dr. Heusser.

On the East, the Paraná and the Plata determine the limit of the Pampean formation, and separate it from that called Mesopotamian, and more to the South, the Atlantic Ocean forms the limit. The Western limit—which touches the Monte Formation—is quite pronounced between Rosario and Córdoba, in about 63° Long. Greenwich; on the South, it appears that the Pampa extends more to the West, although I cannot say so with certainty. The Northern limit—to the Chaco—is unknown, therefore we can only give supposititious information respecting it. For instance, I have read that the inhabitants of the immigrant settlements near Santa-Fé, at their beginning, obtained their principal support by cutting wood and making charcoal, from the trunks of the neighboring forests; and that these forests, although they have retired backwards before the destructive axe, still serve them in the same manner. For this reason I suppose, that the limit between the Pampa and the Chaco forests is found here in about 31° 41' Lat. By drawing this line on the Map on the same degree, to a hypothetical

Western frontier, I use a supposition to help our defective knowledge, but which is not based upon any scientific data. A voyage to the Northern limit where the Pampa joins the Chaco, would be one of the most interesting studies which a phytogeographer could undertake.

The climate of the Pampa formation is principally characterized by more abundant rains, and their more equable distribution in all seasons. The Monte Formation, on the contrary, is almost totally without rain during various months of winter, whilst it is not scarce during this season in the Pampa.

We have no exact investigations respecting the botanical formation of the Pampa, so that we can only give a general description which nevertheless, will serve to give the reader a sufficiently clear idea of its peculiarities.

The principal characteristic I have already mentioned is the complete absence of ligneous-plants with the exceptions mentioned below. We do not know a single tree, nor yet a bush, which belongs to this Formation, whilst another characteristic is the predominance of the *Gramineæ;* the Pampa is really a rich pasture-ground. The Flora is poor and monotonous, it being here where the rule which governs all the Flora Argentina is particularly demonstrated; viz. that the predominion of the social-plants usurps and diminishes the diversity of species, above all in a country born of the waves of the sea, within a relatively short period; a rule which singularly facilitates the task of the agriculturist and the grazer, because the social-plants are exactly those, which are of the greatest importance to these occupations.

Therefore, great herds of cattle took possession of these pastures, where in the beginning, they bred and increased without the intervention of man. Thus, as some few seeds of many European-plants have fallen upon the fertile soil of this Republic, germinating and producing new seed which has increased and conquered the indigenous-plants in the struggle for existence, so also, multiplied the reduced number of horses and cows which was imported, and formed immense herds without the aid of man. Thus these pastures, so favorable for the raising of cattle, constitute the chief interest of the Pampa.

Inasmuch as detailed botanical information is wanting to us, and as yet, I only possess a most superficial knowledge of the vegetation of this plain, I am obliged to reproduce the description of its Flora published in an article of Messrs. Heusser and Claraz, which in a few words, gives us a sufficient sketch of what is known concerning it. These authors say:— "..... and on this account we wish to examine these pastures and their species of grasses with exact attention.

" The inhabitants of the plain distinguish two species of grasses

relatively different; one of them has received the general name of PASTO-DURO—hard grass, and the other that of PASTO-BLANDO—or soft-grass. The first consists essentially of *Gramineæ* which produce up to the period of flowering an excellent nourishment, that on account of its length and hardness is better for cows and horses, than for sheep. It dries after flowering, and then its leaves become as hard as straw, and lose the greatest part of their nutritive substances; nevertheless, the animals can subsist upon it still for some months.

"The soft-grass is composed partly of *Gramineæ* more or less tender and savory, which the inhabitant of the country knows under the name of GRAMILLAS; it is partly composed of some herbaceous and savory plants. Of the last we will only mention the most generalized: viz. two species of TREBOL,—the ordinary clover, and the sweet-scented clover—; a species of *Erodium*, called ALFILERILLO especially found in arenacious soil, and the spotted-thistle—CARDO-ASNAL—whose leaves are an appetising nourishment for both sheep and horned cattle. Until the formation of the seed, these annual plants constitute a truly excellent and agreeable nourishment, especially for sheep; but after the maturity of the seed they entirely die, and when there is an extraordinary drought, the soil is left completely bare, to such a degree, that the animals are reduced to eat such seeds and dry remains of these *Gramineæ* as may be found. There are broad districts, particularly in the Southern portion of the Province of Buenos-Aires, where every summer they are so entirely stripped of vegetation, that the animals, not finding any nourishment, have to be transported to other points. In the virgin-fields of the Pampa, the two grasses are mixed. In general the PASTO-DURO predominates in the more elevated points, whilst the TREBOL and the ALFILERILLO are only seen between the isolated tufts of the grasses; *i.e.*, the TREBOL or clover in the argillaceous-soil of the North, and the ALFILERILLO in the arenaceous-soil of the South.

"This last plant, which spreads even to Chile, always springs up afresh in all seasons, after rain. The first has the same property, but it also has the disadvantage that its seeds are a species of burr called here CARETILLA, which sticks in the wool and diminishes its value. In the lowest parts of the true Pampa, the sweet-smelling clover and the soft *Gramineæ* abound. In the quagmires a miry-vegetation similar to that of Europe is found, among which various species of *Carex* are conspicuous. The plants of this genus are those called PASTOS-AGRIOS—bitter-pastures—by the Gaucho, as a contrast to all the others already mentioned, which he calls PASTOS-DULCES—sweet-pastures. An aquatic-vegetation exists on the shores of the rivers and lakes, which corres-

ponds to that of Europe; that is to say, it is of the same genera represented by different species; a *Dypha*, a *Phalaris*, etc. A species of *Gynerium* is produced also, properly belonging to the Pampas, which is quite generalized, and whose size is a proof of the humidity and excellent quality of the soil; it is called the CORTADERA. By and by, some species of the group of the *Agaves* called CARDAS * are found, which it is necessary not to confound with the CARDOS already mentioned. The first are plants which belong to the natural Flora of the country, whilst the second, although very abundant, were imported. On the South, both the soil and the vegetation, become more and more salty; saline-efflorescences are found scattered over the whole of the Province of Buenos-Aires, and real salt-beds of common salt, more or less fine, appear in the West and South. A vegetation of salt-plants, of which the commonest are the *Salicornias*—called here JUME—is found on the edges of these deposits, as well as on various points of the coast.

"This abundant distribution of salt in the fields of Buenos-Aires, gives them a great advantage over those of the North. In the central parts of the Province of Entre-Rios, we have seen that the animals travel over distances of several hours, looking for the salt-earths to lick them."

Here ceases the quotations of our travelers, but I again desire to call attention to the fact already mentioned, that at many places the indigenous vegetation has given place to an immigrant vegetation, which now covers great extents of surface, and has perfectly altered the original vegetation of the Pampa. So it has been with different thorny-plants, the burrs, the *Cynara Canduncul*us, the fennel, the *conium*—hemlock—and some others.

The exceptions to the general character of the Pampa already pointed out are three. First, it is said that a narrow strip of trees and bushes is met with along some of the rivers. Then, according to Dr. Heusser, in the Sierra del Tandil, from Tandil to the Mar-Chiquita, and on the other side as far as the Laguna de los Padres, there is a region which is characterized by a dense brushwood about the hight a man, called CARMAMOEL, of a thorny-bush which has no leaves, but instead thorns in the form of a cross. This peculiarity renders the lands where it exists almost impassable, and greatly incommodes the breeders of cattle. According to the indications of Mr. Claraz, this plant is

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* The responsibility of the botanical information here given, and which we have not been able to test, belongs to the authors already cited, and from whose report we have here extracted. Relying upon my superficial knowledge of the Pampa, I do not believe in the exactitude of the determination of these *Gynerii*, nor of the *Agaves*, which rather appear to me to be a species of *Eryngium*.

a *Colletiá cruciátá;* another species the *Colletia insidiosa*, is also very characteristic ; in the Formation of the Chaco, at times, exclusively composing the brush-wood of that Formation.

The other exception consists in a strip of woods which extends from the latitude of Buenos-Aires down to the Mar-Chiquita, along the sea coast, so that it might be called the woods of the littoral. At certain points it extends 15 leagues from the coast, and consists principally of TALA, CORONILLO, and ESPINILLO. The boskets near Dolores, Tordillo, and Montes-Grandes, are composed of these arborets. Those forests would also be considered as a continuation of the Mesopotamian Formation that probably covers also the Banda Oriental.

Let us now contemplate, the physiognomy of the Pampa, and the distribution of those vegetables which are found in it. I will only refer to that part which I personally — but superficially—know, the Province of Santa-Fé, which has, moreover, the advantage over that of Buenos-Aires, of being less modified by the browsing of domestic animals--especially the sheep.

The idea which we had formed from our childhood by reading popular works, that the Pampa is a perfect-level, is entirely inexact. The soil is slightly undulated, and although at first sight the elevations and valleys, are little remarked, they are soon recognized by the difference of the vegetation. These undulations are of the greatest practical importance to the inhabitants, and particularly so to the European immigrant who dedicates himself to agriculture in preference to grazing. Rich farms and flourishing communities, where the waving wheat attracts our attention, satisfactorily prove this assertion.

These agricultural settlements are particularly met within the CAÑADAS or flat depressions, at the bottom of which small lakes are often found, which provide the necessary water for man and beast: but when failing these, it can nearly always be procured by sinking shallow wells. In these valleys, Nature also indicates by the tender herbage intermixed with flowers, those conditions most favourable to vegetation, and there, the cultivated plants find a relative abundance of water, and a rich, virgin-soil, charged with soluble and nutritive mineral substances.

To the thick sward, some other plants of different families are added—which according to the relative quantity of salt and humidity—constitute a variegated vegetation, whether it be composed of creeping-plants with pulpous leaves, or of herbs which, like the purslain, form a healthy and appetising nourishment to man. To these we can add others, which charm the sight by the rich adornment and brilliant colors of their beautiful flowers—such as, above all, the *Portulaceæ*, the Vervain, with their blood-red flowers, the *Compositæ*, the *Euphorbieæ*

Papilionaceous plants, etc.—and which are, in general, an admirable food for the animals.

The small elevations of the immense Pampa, are drier, and their vegetation presents some strange peculiarities to the foreigner, on account of the difference from that of his own country. The dense, compact, and magnificent sod, which forms the European pastures is no longer seen, but instead coarse and dispersed tufts of hard and dry *Gramineæ*, which cover the yellow-clay like thousands of little islands; the genera *Stipa* and *Melica* principally furnish the species. At the places where this formation is most pronounced, the earth is cracked between the tufts, and is often washed away by the rains, so that the grasses are left on little eminences. It sometimes happens that these interstices are covered with tender and small *Gramineæ*, whose species are reduced in number, but the greater part of which have brilliant colors. Among the small number of these species which always predominate in this Formation, a considerable number of other species is also found, which requires an exact and detailed study, but of which there is no doubt, the greater part is identical to the following Formation which we know better. At a certain distance these *Gramineæ* have the appearance of a compact-sward, and thus the Pampa appears like a lawn of very varied color, according to the season: black as coal in the spring, when the dry-grass of the previous year has been burnt; bluish and clear-green, when the young leaves begin to grow; a little later brownish-green—the colour of the adult-plant; and finally, white as silver when the seeds ripen. Then, it is easy to imagine yourself in an ocean of liquid and undulating silver. According to Dr. Heusser, the Pampa of the South more resembles a perfect plain, because it is less undulating, the tufts of the grasses are thicker and resemble more a thick-sod, and their color is said to be a purer and fresher green.

After the *Gramineæ*, the family which is represented in the Pampa by the greatest number of specimens, is that of the *Compositæ*, to which belong a number of semi-bushes with poor flowers, only one species of *Solidayo* of a lively yellow color is prominent among the others. As for the rest the Vervains, the Mallows, the *Portulaceæ* and some Papilionaceous plants, constitute the poor Flora of the Pampa, which certainly presents more attractions to the pastor and the agriculturist, than to the Botanist. Species of reeds and a large *Eryngium*, adorn the borders of the swamps and ditches.

The absence of trees in the Pampa is a problem as yet insufficiently explained, and so much the more strange is it, when the soil is entirely fit for arboreous-vegetation. Many trees might be already growing which would supply the first necessities, were

their want sensible; but of this no one speaks, because the country cooks are slow to abandon their custom of using argols for fuel. I ought to mention the Peach-tree which produces both fruit and fuel, as among those trees which grow with facility and rapidity; also, some species of the *Eucalyptus*, the *Robinia*, the Paradise-tree, and the Lombardy Poplar. Some other species it is quite difficult to cultivate on account of the quantity of ants. The OMBÚ —*Pircunia divica*—attracts the most attention among all the trees of the Pampa, on account of its strange appearance; it is much cultivated for its shade, but for the rest it is worthless.

The Pampa changes its aspect owing particularly to the browsing of the sheep, which causes the hard and isolated grasses to disappear, and reemplaces them by a compact-pasture of tender and shorter herbage. Thus it is that the Pampa between Buenos-Aires and the river *Salado*, has totally changed its character. I have read in our agricultural periodical that it is believed this change is advantageous, but Messrs. Heusser and Claraz think that it is a sign of the impoverishment of the soil; an opinion which appears to me to be more correct. The breeder of horses and horned-cattle cannot be deprived of PASTO-DURO; he requires it to nourish his animals during the winter, and therefore a good country establishment ought to have land of the two kinds. In the mean time it may be believed that these circumstances will probably change, when the raising of cattle be undertaken in a more rational manner.

Abandoning the Pampa, let us turn our sight to the West.

IV. THE MONTE FORMATION.

The word forest is expressed in Spanish by *Monte; selva*-forest, is not used in this country, at least not with that definition. Not only the groves but also the brambled and bushy places, are here called by the generic name of Monte, and for this reason I have preferred this term to indicate this Formation which exists in the Argentine Republic, and is partly composed of forests, partly of shrubs and brier-bushes. Prof. Grisebach in his celebrated work "The vegetation of the Earth" *(Die Vegetation der Erde)*, has called this same Formation by the name of CHAÑAR-steppe, which I am inclined to change for that of the Formation of the MONTE: in another treatise I have given the motives which impel me to this change.

This Formation is similar to that of Patagonia on account of the aridity and the predominance of the ligneous plants. It appears that many bramble-beds—according to the little we know of the Patagonian Formation—are common to both Formations, and the question remains—which only future investigations can determine—whether

they do not compose one single Formation. It has not yet been explained how this dry climate has produced an arborescent vegetation, whilst it is utterly wanting in the more humid Pampas.

The limits of this Formation cannot yet be explained. On the East they are probably—according to the only exact observation which I know respecting it—in 63° Greenw., and on the West they are immediately bounded by the Formation of the *Puna* of the Cordilleras, without, as in the Sierra of Aconquija any tropical formation separating them. Consequently these limits differ as much from a straight line, as those of the Cordilleras and branches, which are found in the same degree. The limit which on the South separates it from the Patagonian Formation, is totally unknown: on the North, it is bounded by the Sub-tropical Formation, where the high peaks of Aconquija begin to show themselves attracting so much humidity, and abundantly distributing it to the slopes of the hills, and to the extensive plains which open at their feet.

Some transitory forms and those numerous species which extend from one formation to another, efface here the boundary which ought to be marked in about 29°.

On the East and N. E. it is bound by the Formation of the Chaco, whose elements partly extend on some points to the territory of this formation, and from the great similarity which exists between both, their limits can yet be less exactly drawn than the line which separates the Monte and the Sub-tropical Formations.

The Formation of the Monte also sometimes presents itself in some spots included in the Sub-tropical Formation, at those points where an extensive valley in an inconsiderable elevation, unfavorably modifies the humidity; as for example, on the road from Tucumán to Salta, in the valley of the river Tala, where the Sierra of Candelaria places a dike to the currents of damp-air, and limits the Sub-tropical Formation immediately to the slopes of the mountains, the bottoms of the valley being left to the Monte Formation; whilst the Sub-tropical Formation on the contrary, opens its way across the Monte Formation, as seen in the narrow and damp valleys of the Sierra of Ambato.

The presence or absence of water, more than any differences of climate, determine the predominance of one or the other formation throughout the whole Republic. It appears that this one which now calls our attention, is independent of the geological formation. It is alike found in the clay of the Pampa, in the dunes of Catamarca, or in a granitic or calcareous soil.

Let us now examine the principal trees and bushes which cover these lands, and thereafter throw a glance over their most important herbs and *Gramineæ*.

Almost all the trees and bushes which constitute this Formation

have poor and diminutive forms, with bristling and scattered branches, provided with thorns or thorny-leaves. The *Mimoseæ* family, which, from the number of its species and members, constitutes one of the most accentuated characters of the Monte Formation, is particularly distinguished by these peculiarities, therefore, it requires our special attention here.

We would forget the object of this book were we to mention all the species of *Prosopis*, *Mimosa*, and *Acacia* which have been found up to the present; therefore I will only cite those which most characterize the physiognomy of the landscape, or which, from their practical use deserve to be recorded. In this point of view, some species of *Prosopis* called ALGARROBO take the first place, particularly the ALGARROBO-BLANCO—white—*Prosopis alba*—which is the most useful and esteemed. Some of the species of ALGARROBOS look like bushes, whilst others are sometimes quite-high trees; their trunks branch at a short distance above the ground, and the top is thin on account of the smallness of its feathered-leaves. Sometimes this species forms woods almost exclusively by itself, but it is generally met allied to others; it is esteemed for its timber, which is used in the construction of the cabins of the rural population, and which, moreover, possesses a high value as fuel. Its fruit, which is a pod of sweet-pulp, is an excellent nourishment for cattle; the inhabitants also eat it, and make of it a species of bread called PATAI, and a liquor which when new is refreshing, but becomes alcoholized after fermentation. In some districts this liquor is the principal attraction for social meetings.

Some of these trees are generally left standing near the houses on account of their shade, because it would not be worth while to plant them for this purpose, they grow too slowly. Were it not for this reason they would soon disappear, such is the reckless way they are exploited.

Almost all the other *Mimoseæ* of this region are bushes or smaller-trees, of which I will only mention a few, so as not to exceed the space allotted to me; respecting details, I will refer the reader to my special studies.

The ÑANDUBAY—*Acacia Cavenia*—in other districts called ESPINILLO, produces a fruit which contains a great deal of tannin and is employed as a black-dye, whilst its hard and heavy wood is much sought after whether for fuel or industrial purposes, particularly where it is abundant.

The *Acacia moliniformus* bears a fruit much sought after by the animals. A gum which might be useful, exudes from other species; both fruit and bark contain much tannin. Some species are characterized by enormous thorns, which render these Argentine woods in some parts almost impenetrable.

Next to these *Mimoseæ*, the commonest plant is the TALA, which is also found in the Sub-tropical Formation and the Chaco, and in the Mesopotamian Formation; some plantations of it exist in the Pampa, where it serves as a thorny-hedge. The different TALAS belong to the genus *Celtis*, the commonest are the *Celtis* TALA, and the *Celtis Sellowiana;* the former is bushy, the latter grows to beautiful, great old-trees, which together with the ALGARROBOO, are left around the habitations for their shade. The timber is worth little, and the fruit nothing, so that its only practical utility is in its shade, and the construction of hedges.

Next to the TALAS, the most important trees of this Formation are the QUEBRACHOS, three species of which do not belong to the same family, although they are commonly designated by the same name.

The QUEBRACHO-FLOJO—weak—or QUIRILIN—*Iodina rhombifolia*—is a branchy bush or little-tree with rhomboidal leaves, which have thorns at three angles; this plant characterizes the formation from its abundance, but it has no industrial application, and is hardly fit for hedges.

The QUEBRACHO-BLANCO—white—*Aspidosperma Quebracho*—is a tree of middle-size with oblong, oval, coriaceous and thorny leaves; it forms great forests in the Interior, surpassing the other bushes in size; in the form of a bush it also contributes much to the formation of the thickets. Its timber is very useful, and latterly has been applied to the xylographic art. Its bitter-bark is one of the popular remedies for the intermittent fever.

The third QUEBRACHO is the COLORADO—red—*Loxopterygium Lorentzii*—which rather belongs to the next Formation, although it is found in this one; it is better, however, to describe it in the Sub-tropical Formation.

The MOYES, or MOLLES, compose a certain group of plants which more or less resemble each other, and hold a position of great importance in this Formation; in one or other of their organs they have a terebinthine odor, and, indeed, a part of them belong to the family of the *Terebintaceæ.* The most characteristic species is the MOLLES Á BEBER—to drink from—because from its fruit a sweet, aromatic, and refreshing liquor is prepared. It is a magnificent tree, and the most beautiful of this Formation; it belongs to the mountains, where its roots penetrate the fissures of the great rocks. The following species are bushes or arborets which compose an integral part of the thickets, and belong to the genus *Duvana*; its berries are aromatic, and are sometimes used as incense. One of these species, called MOLLE Á CURTIR—to tan with—merits a special mention, because its leaves produce a valuable material for tanning. *En passant* I note here, two species of black MOLLE, which also enter into the thickets

of this Formation. Another neighboring species is the ALVARILLO DEL CAMPO—*Ximenea Americana*—notable for its savory and refreshing fruits, similar to plums, and only the more agreeable because it contains a certain after-taste of bitter almonds.

The family of the *Verbenaceæ* is of great importance to this Formation, where it is represented by a certain quantity of bushes of *Lippiæ*, elegant or graceless, which powerfully contribute to the character of the Formation, inasmuch as they sometimes cover nearly alone, whole tracts. They are all aromatic, and the commonest species is the POLEO—*Lippia turbinata*—which has a certain odor of turpentine, and whose leaves are used as a tea, nnder the name of "té del pais." Another species, the *Lippia Lyciodies*—AZAHAR DEL CAMPO—field orange—adorns the fields with its delicate and elegant figure, as well as by the vanilla-perfume of its white-flowers. The POLEO DEL CASTILLO—*Lippia Polystachya*—is a tonic medicament much esteemed by the people, and the *Lippia salsa* forms an integral part of the brush-woods which grow salt-deposits. Further on the herbaceous *Verbenaceæ* will be mentioned. A couple of beautiful *Muddleyas* have an exterior resemblance to the *Lippias*; these plants would have a fine effect in our gardens.

In this enumeration of vegetables, I take as a rule the frequency of the plants enumerated, and in which they contribute to characterize the Flora of the country, without binding myself to any systematic order. The inflexible form under which, as men, whether verbally or graphically, we are compelled to express our ideas, obliges us to name one after the other. Many things which properly ought to be represented, either at the same time or in a tabular form, have to be enumerated in a lineal series.

This plan of my sketch forces me to mention now, one of the most characteristic arborets of this Formation, and which caused the celebrated Grisebach to impose its name upon the whole Formation of which it is one of the commonest elements. It is the CHAÑAR, which belongs to the Papilionaceous family, and is called *Gurliaca decorticans*, because it annually changes the outside of its bark, which is then renewed. The CHAÑAR produces a sweet and savory fruit; its wood is firm and appreciated on account of its excellent quality, notwithstanding its low-growth and irregular form, much impairs its value. It is only in the sub-tropical region that it appears as a high-tree, though even then its trunk is not regular.

The BREA—*Cæsalpinia præcox*—is a plant which has its greatest growth in the Western part of this formation, at the foot of the Cordilleras, and is very similar to the CHAÑAR in its organs of vegetation. It is a bush almost as high as a tree, with pointed

leaves and a green-bark, and produces a species of resin much sought for.

The *Cæsalpinia*, or *Poincinia Gilliesii*, is one of the commonest bushes of the fields. Although it be not very elegant in its vegetable parts, it is characterized by beautiful flowers, which, from their long stamens, are called the DISCIPLINA DE MONJAS —scourge of nuns—; it is also called MAL DE OJO—evil-eye—and MAL DE LOS PERROS—dog-sickness—on account of its yellow-pollen, which is considered to be poisonous; it is also found in the Sub-tropical Formation and that of the Chaco.

Some leafless *Cassieæ* also begin to show themselves here, such as the *Cassia aphylla*, which give to the landscape a singular character.

A couple of *Farillas* of different families, the *Larrea divaricata* and *Zuccagnia punctata*, form large thickets, sometimes alone, at others associated with bushes of different classes; these species are about the hight of a man, elegantly formed, and giving a clear-green foliage. The people unite these plants under the same generic name, notwithstanding their diverse classificátion, because they contain a great quantity of resin, which makes them viscous and gives them a penetrating odor; even when green they burn with a bright flame. The first species is scattered all over this Formation; the second belongs to the Western region. The thickets or brushwoods which they form are called JARILLARES, a name which is given to many "estancias," or grazing establishments. Another characteristic plant of this Formation is the *Porliera hygrometrica*, near Córdoba, called GUAYACÁN, and farther to the North CUCHARERA, where it reaches a greater hight, because its hard and durable wood is employed for all kinds of carving, and especially for the making of spoons.

The family of the *Zygophylleæ*—to which the *Larrea* and the GUAYACÁN belong—presents some other common and characteristic plants, of which I only mention the *Retama—Bulnesia Retama*—which is indigenous to the wilderness of the Western half of this formation; its green and sometimes pendant-branches leafless during the greatest part of the year, assimilates it to the *Casuarinas* of New Holland; its seeds are dry and winged. Sometimes this tree has a hight of 25 feet, and then its trunk is one foot in diameter; its wood is useful.

The *Oxycladus* which secretes a layer of wax in its branches, is another plant equally characteristic of this Formation, or perhaps of the PUNA. A very similar vegetable—or perhaps the same—serves the Patagonians for the manufacture of wax. Some other leafless plants also determine the character of the Western part of the Formation under consideration, but were I to enumerate them all, my description would be too long.

I ought to mention two bushes of the *Rhamneæ* family on account of their generalization and peculiar form: the PIQUILLIN, —*Condalia microphylla*—is a principal element of this Formation, and in fruiting season a real pleasure to the Gauchos' children who eat its fruit, or gather it for preservation in sweet-meats. The other is an arboret which is leafless the greatest part of the year, and has formidable thorns—*Colletia spinosa*;— its wood is as hard as iron, and is useful for various industrial applications. In the Monte Formation this species belongs to the hills or low-mountains, whilst in the Mesopotamian Formation on the contrary, it appertains to the Flora of the river-banks, if it is not another species—*C. insidiosa*. In the first, it is called BABBA DEL TIGRE —tiger's beard,—in the second, ESPINA-CRUZ—thorn of the cross. The ATAMISQUI—*Atamisquea Marginata*—is also very common, as a high-arboret, whose leaves, flowers and fruit, have a fetid odor and are good for nothing; it is only characteristic for its abundance.

The *Solaneæ* are of great importance in this Formation. Some of its species are the commonest bushes, which by their handsome flowers become an ornament to our fields; in the Sub-tropical Formation they appear as trees. Together with that of the *Compositæ* and that of the *Amarantaceæ*, this family is the richest in species and in individuals: the species of the genus *Lycium* is found in abundance in the thickets and hedges. I mention the following: *Lycium cestroides*, a strongly-branched bush higher than man, with tubiform and violet flowers, much sought by the humming birds: the *Lycium ciliatum* a weak-bush, grows among other plants which protect it, and for this reason it is plenty in the hedges: other species of *Lycium* prefer a saline-soil. The *Cestrum patens*, and the *Solanum sordidum*, are very common and small-bushes, without thorns, which are found in the clearings of the thickets. The *Salpichroa rhomboidea*, a weak-bush with spreading-branches, is also found in the hedges and under-brush, and when it does not find a convenient support, it becomes a Creeper. Its fruit about the size of doves' eggs, with some flavoring, is edible: it is called UVA DEL CAMPO — field-grape.

There is a wild-species of Spanish pepper called AJÍ—*Capsicum microcarpum*, which also has the form of a small-bush. Its small red-fruit is much sought on account of its extremely piquant taste. The other classes of AJÍ are cultivated plants.

A considerable number of species of the great *Sinantereæ* family, occupy an important place from their numbers, yet they contribute but little to the formation of the thickets.

Whilst we find in the following Formation various *Compositæ* with the appearance of bushes or of trees, we only find here some

low-bushes of this family: the species for the most part, are herbs or semi-arborets.

Some species of *Bacharis*, particulary the *Bacharis lanceolata*, similar to the European willow, are prominent among the bushes which are found on the river-shores. This species is frequently accompanied by another—the *Vernonia salicifolia*—with handsome flowers: the *Proustia pungens* also belongs to the river Flora; it is quite a high-bush with leathery and thorny leaves. Some affiliated species of *Bacharis*—whose branches are leafless and alate, and in general do not reach to man's hight—are not less characteristic and common.

Some *Compositæ* are particularly found in the mountains where they form compact thickets; viz. the ROMERILLO—*Heterothammus brunioides*—a low bush with needle-formed leaves and yellow-flowers; it is used for dyeing this color; the *Flourensia campestris*, with broad and lustrous leaves, and quite large yellow-flowers.

The *Jussiaea longifolia* of the *Onagrariæ* family bears a habitual resemblance to the *Baccharis lanceolata;* both appear to be willows, and it is surprising in autumn to see the great difference in their flowers and the similarity of their other organs.

The *Euphorbiaceæ* present a small number of ligneous-plants in this Formation: to this family belong the odd species of *Jatropa* and *Manihot:* their leaves are digitated, large and lustrous, and their fruit sometimes of the size of an apple. These plants prefer the rocky and dry slopes. Some species of *Croton* and of *Acalypha* form low-bushes, which in general hardly reach the hight of a man: the strongly purgative property of their seeds is well known. This same property—not so energetic but more salutary—is found in the *Ricinus*, which, sometimes isolated, sometimes in groups, appears on the river-shores in this Formation.

The *Cacteæ*, as strange in form as abundant in distribution, hold a place of the greatest importance among the vegetables of this country on account of their abundance: some of them are real giants. The largest which belong to the genus *Cereus* are found at the West. Sometimes they reach the hight of 40 feet, and their wood is used in different industries, and even in the mines. Other species of smaller size are partly strongly-branched, and partly much grooved. The *Opunciæ* sometimes even more abundant than these, are also of different sizes. Some are very branchy and 25 feet high, whilst others are hardly raised above the level of the Earth. Some are provided with formidable thorns even to 9 inches in length. One of these species produces the TUNAS or figs of Algiers—also called "Indian figs;" some breed the Cochineal insect, the rational and regular cultivation of which could be made of great importance to the country. At present, almost all which is collected is consumed *in situ*.

The flowers of the high *Cereus* are generally white, those of the *Opunciæ*, yellow-orange color or yellowish-red. The serpent-formed *Cacteæ* with a flower of a lively-red color, and the *Maniclariæ* are relatively rarer in this formation, and are not so abundant as to contribute to the character or to the physiognomy of the landscape.

Some other small families are also represented in this Formation by important and characteristic species; viz. the MISTOL—*Zizyphus Mistol*—a sufficiently-high tree, which produces an edible-fruit of the size of a bullet, and whose bark answers the purpose of soap; it specially found in the Northern part of this Formation: the COCO—*Xanthoxylon Coco*—a middle-sized tree of a strong and disagreeable odor, whose bark is covered with characteristic thorns: the Willow of Humboldt, a splendid tree, whose habitat is the river-shores; the Elder—*Sambucus australis*—very similar to the German Elder, is particularly found in the hedges; the *Berberis ruscifolia*, a small thorny-bush with yellow-flowers — its dark-colored berries are used to manufacture a species of ink, and its roots produce a yellow-dye; the handsome *Nesaea salicifolia*, a slender, middle-sized, thornless bush, with beautiful yellow-flowers; the *Rupreohtia coryfolia*, and the *Bougainvillea stipitata*, of which the first, is a quite-high and strong arboret, and the last, a small tree with sharp-thorns—these two species are found in the mountains. I cite also the QUEÑOA—*Polylepis racemosa*—which, according to Mr. Hieronymus, forms a characteristic region in the Sierra of Córdoba in the same way as we find it in the Sierra of the Sub-tropical Formation. Another *Rosacea* is the *Kageneckia angustifolia*, a small tree with star-shaped fruit.

The *Myrtaceæ*, which present in the next Formation the aspect of true-trees, are represented here by a little-bush which produces a tea of an excellent flavor, *Psidium thea*.

In some places thickets are met with principally composed of *Justicia campestris*, with beautiful-flowers, whilst the *Justicia xylosteoides* with more scattered specimens, is an ornament of the higher thickets. The only plant of the *Gymnospermeæ*—the *Ephedra triandra*—immediately attracts the attention of those who do not know it, on account of its singular form and red-fruits: it is a leafless-bush, more or less a climber, which very rarely becomes a tree as large as one foot in diameter. The small, red and watery-fruit, is almost tasteless, but is eaten under the name of PICO DE LORO, or parrot's-bill: the women collect the roots for dyeing purposes.

Among the arborets I ought not to omit mention of the JUMES, which cover a great part of the salt-deposits; they are more particularly *Grahameæ* and *Chenopodieæ*; two species of *Spirostachys*, *Suæda divaricata* and *Atriplex Pamparum*, are the

principal vegetables, whose hight generally equals, and often exceeds, that of a man; their ashes are used in the manufacture of soap. Their great quantity will probably some day originate a regular industry in this respect.

In connection with the ligneous-plants, I must not to forget the boskets of Palm-trees, which cover a part of the Province of Córdoba. The species is temporarily called *Copernicia campestris*, Burm., until its true place in the system has been positively determined; it has been classified rather too hastily as belonging to this genus, and its specific name does not correspond to its nature, because it has not its home in the fields, but in the mountains, where it forms great-forests; in the fields only some isolated specimens are found. Its hight is about 30'; fans are made of its leaves, and its fruit is very sweet and much sought after by animals; mankind also eats it, both fresh and in sweetmeats; and a species of rum has been made from it. The timber is not worth much, nevertheless the rural population uses it, especially for "corrales," or cattle-enclosures.

If I could also attempt to describe here with the same exactitude all the herbaceous plants which contribute to mark the physiognomy of the landscape, as I have done with the trees, bushes, and ligneous-plants, I would surpass the limits at my disposal; I shall, therefore, content myself with mentioning only the commonest, and then presenting a general sketch of the vegetation, or of the Flora, which is found scattered among the trees and under-brush.

The wealth of this Formation in climbing plants contributes much to characterize its physiognomy; these plants are more particularly found in the open boskets.

The *Bignoniæ* give us some species, of which the most abundant is the *Anemopægma clematoideum*, that immediately attracts the attention on account of its magnificent flowers and singularly-shaped fruit. Of the other families I mention the CABELLO DE ANGEL—*Clematis Hilarii*—whose fruit is employed as blisters; numerous specimens of *Asclepiadeæ*, whose stems are lactiferous: viz. the TASI—*Morrenia brachystephana*—which is very characterized and common, and whose seeds have a silky and white crown, which is used as tinder; they are enclosed in a sweet edible-pulp.

The *Passifloreæ* especially adorn the boscages of the river shores with their large-flowers and yellow-fruit; some *Convolvulaceæ* festoon the hedges or slip along the ground; the flowers of some of these are very beautiful; viz. the *Ipomea purpurea*, the *Ipomea acuminata*, the *Convolvulus Montevideensis*, the *Breweria sericea*, etc. I ought to mention here also the MECHOACAN—*Ipomea Mesopotamica*—the large root of which is one of the pop-

ular purges, and an ornament to the sandy-wastes. There is a species of *Manettia* very similar to a *Convolvulacea*, which is likewise found in the hedges. A great part of the climbers of this Formation belong to the family of the *Cucurbitaceæ;* viz. the *Adobria viridiflora*, and the *Sycios malvifolius*, which entwines the copses, whilst the COLOQUINTIDA is found on the sandy shores. The *Boussingaultia baselloides* festoons the thickets with its lustrous and carneous leaves, and elegant-white flowers; it is cultivated by man, and adorns the corridors of his homes. The *Cuscuta*, which, it is said, is fit for the manufacture of vermicelli, is a transitory form between the climbing and true parasite plants.

That which is vulgarly called parasite—a plant which fixes itself on another—is not so always in a botanical sense. In this science two classes are distinguished; the true-parasites, which are nourished by the sap of other plants, and the *Epiphytes*, which only rest upon them without penetrating their substance or absorbing their juices, but are nourished by the dust and by the products of the decomposition of the bark and the atmospheric precipitations. These two classes are represented in this Formation by some characteristic species. The true-parasites are specially the *Loranthaceæ*, of which the *Loranthus cuneifolius* is the most apparent, on account of its abundance and its magnificent-red flowers. The *Epiphytes* specially belong to the genus *Tillandsia;* some of them are seen suspended in the habitations, on account of their splendid and aromatic flowers, which, from their method of production, are called air-plants—FLORES DEL AIRE.

Even yet more superficial must be the enumeration here of the herbs and *Gramineæ* which cover the soil. Here, as in the Pampas the *Gramineæ* occupy the first rank, inasmuch as they constitute the basis of cattle-breeding, and consequently of the national wealth. The greater part of these are hard-herbs which always form isolated groups among the bushes and trees, and sometimes quite extensive beds in the open spaces of the thickets. The *Stipa enusima*, the *Melica papilionacea*, and the *Melica macra*, are the commonest, and may be considered as the most characteristic species of this Formation. The tender-grasses are particularly found along the river shores and in the low-grounds, but are not abundant. Again, the mountains offer other species, and the table-lands are covered with compact and strong blades of grass, which sometimes form a real-sward; but this vegetation has not been sufficiently studied as yet, although a certain number of species have been already described; I will only mention the *Arundo occidentalis*, a plant of the mountains, which in some descriptive voyages bears the name of GRAMA DE LA PAMPA—*Gynerium argenteum.* Some species of *Gynerium* are found upon

the banks and shores of the rivers, which have been torn away from the valleys by the water-courses. I could not asseverate that a species of *Gynerium* really exists in the Pampa; should this, however, be the case, it must be different.

Where the brush-wood is thicker, the *Gramineæ* are less compact. Much bare-soil is found where species of other families are dispersed without completely covering it. The *Compositæ* again occupy the first place here, with an increased number of species, although the characteristic forms are little numerous; therefore, I will not make a detailed enumeration of them, as I have done when treating of other families. Some species are useful, and consequently may be considered as of fabrile importance: viz. the *Flaveria Contrayerba*, for a yellow dye-stuff, the MATAPULGA—*Schkuhria abrotanoide—Ang.* flea-killer—as an insecticide; the *Xanthium spinosum et Italicum*, which sometimes cover extensive strands, the *Zinnia Paucaflora*, are popular remedies, and the first is notable for its abundance, which makes it pernicious. Some species of *Senecio*, *Eupatorium*, and *Conoclinium* are widely disseminated, and known for their beautiful flowers.

The *Amaranthaceæ* now present themselves, and as rich in species as abundant, they may be considered as true characteristic plants of the Argentine Flora. Some species, as, for instance, the *Alternathera rosea*, and the *Alternanthera ligulata*, which frequently embellish large surfaces with their rose-colored flowers, are real field-ornaments; medicinal properties are attributed to some others. The *Solaneæ* are also rich in species and individuals; some of them are diaphoretic; viz. the wild-grape—*Salpichroa rhomboidea*—which has fruit of the size and flavor of the grape, but produced singly and not in bunches; the handsome *Nierembergia Hippomanica*, an ornament of the fields, but poisonous to animals, and for this reason it is called CHUCHO, the popular name for the intermittent fever; handsome *Petunias* and species of tobacco, as well as the AJÍ—the most esteemed Argentine pepper of which we have already spoken—adorn the shores of the rivers and aqueducts.

Some species of *Solanum* also contribute to the formation of the green-sward; to wit: the *Solanum spinosum*, with its pretty flowers, and yellow or variegated fruit.

Some shrubs of the *Verbenaceæ* family, which we have already met in the Pampa, are abundant here; particularly the scarlet verbena, amongst others less brilliant, is very common; the pretty species *Priva bacois* is frequently found around human habitations.

Now we find divers genera of *Malvaceæ*, both creeping and erect, with white or red flowers. Some *Rubiaceæ* call our attention from their abundance, particularly the *Richardsonia scabra*

and the *Metrocarpum cuspidatum*, whilst the roots of some *Galia* are used to manufacture ink. The *Asperfolia* give us some species of *Heliotropium*, which ornament the generally-poor ground with their magnificent flowers, or constitute, in some parts of the salt-deposits, the principal humifuse vegetation.

I will cite here some plants of diverse families, which, on account of their abundance, present a distinctive character of this Formation; viz. the *Menodora trifida*, the *Scoparia primatifolia*, whose flowrets are yellow and ligneous; the *Nama echiodes*; the *Mentzelia albacens*, and the beautiful *Æmthera* on the river shores; the *Fussiaca repens* frequents the stagnant-waters, accompanied by the *Hydrocotyle natans* and the *Hydrocotyle Bonariensis;* also the species of *Martynia*, with fruit of a singular form, and, moreover, some *Eryngium*, particularly the magnificent *E. agavifolium*. The other *Umbelliferæ* are generally imported species, of which, like the common *Conium* and *Alumi visnaga*, have multiplied prodigiously. Some species of *Portulaceæ* are worthy of mention, as, for instance, the magnificent *P. grandiflora*, whose purple-flowers embellish large extents of country, and some others with which excellent salads are prepared; other species, like the CARNE GORDA—*Jalinum patens*—are frequently added to the soups; the *Oxalis commersorii* is found in abundance in cultivated places, its shrubs covered with yellow-flowers, whilst some *Lythariеæ* prefer the free and arid fields.

The *Monocotyledones*—excepting the *Gramineæ*—are poorly represented, and, inasmuch as in other dry-climes like that of the Cape of Good Hope, we see in the first days of spring a certain number of *Liliaceæ*, *Amaryllideæ*, *Iridiæ*, etc., we only meet here with some species of these families with ephemeral white or yellow flowerets. Over and above some species of Epiphytes of the *Bromeliaceæ* family, which we have already mentioned, others yet exist which form thorny copses upon the dry soil, and some which, in the stony vallies, cover the sides of the dry rocks with greenish-grey tints, and with their yellow or red flowers. The *Cyperaceæ* are also equally scarce in this region of little water. It is only worth while to mention two imported *Monocotyledones*, because they contribute to determine the characteristic aspect of the rural establishments; they are the Agave and a species of *Arundo*—probably *A. Doxa*.

The *Criptogamieæ* may be passed almost in silence in this sketch. I will only mention the following: *Selaginella rupertris*, an abundant plant which always, after rain, clothes the bare-places of the rocky-fields with a clear-green sward; the *Azolla Magellanica*, which covers the stagnant-waters with its swarthy buds; the *Equisetum gigantecum*, which, together with other shrubs, sometimes forms thick-copses on the sides of the moun-

tains; and, finally, some species of ferns, which, with the *Promulaceæ*, cover the damp soil and the dry but shady rocks.

It is necessary that we should throw a glance upon the grouping of the plants of this Formation, because we find here various characteristic combinations, or rather sub-formations. In the first place, this Formation should be divided into two parts, the Western and the Eastern, whose line of demarkation may be considered to be the Sierra of Ancaste. The valleys situated between this Sierra and that of Ambato, present species of both parts, thus forming a district of transition; yet farther beyond the point of the Sierra of Ancaste, the *Bulnesia retama* extends even to the Salines.

The Western part, situated between the Cordilleras and their branches on the North and South, extends—according to the small information we possess—to the Patagonian Formation, from which, probably, it is not possible to distinguish it. It presents, moreover, various elements belonging to the Eastern part, and I may even say that it is not possible for me to mention a single plant, nor bush, nor tree, which is completely wanting in the Eastern part; but on the contrary rather, this part presents some elements which I have not found in the other. Among the principal ones I cite the *Bulnesia retama*, the pretty Visco—mistletoe—*Tricomaria usilla*, the giant of the *Cacteæ*, *Cæsalpina exilifolia*, a *Mimosa afila*—*Oxycladus aphyllus*—which probably belongs to the Puna, and some others, such as the *Tulisquin*, which have not yet been determined. The want of information prevents my continuing the comparison to the herbs, but this comparative study can do no less some day, than throw a lively light upon the characterization of these two parts. The collection of Mr. Schickendantz contains a certain number of species which have not been observed as yet in the East.

I have several times called this Western part a "waste," and in effect it presents this character in general. The Cordilleras stop the Ocean-airs from the Pacific, and all other vapors, which might reach it from the Atlantic by crossing the great plains on the East, are detained by the other outlying-mountains which ought to be considered as branches of the Cordilleras. From these circumstances results a climate so dry, that not even fleas can live there! The rains are extremely rare, and agriculture impossible, save at some points where the high-mountains originate a river or stream, which enables the valleys to be cultivated by irrigation; and where, according to the quantity of water, cattle-farms —*estancias*—or villages like Fuerte, Belen and others, have been established. These settlements possess a powerful charm, particularly when one reaches them after having journeyed over the wastes which separate them. The water from a river of this na-

ture is generally sufficient to irrigate a number of fields of *alfalfa* —lucerne—and the country-seats, where sometimes magnificent vineyards exist, but all that water is consumed *in situ*, so that lower down only, the dry-bed of the river is seen, which alone in times of rain carries a little water to the surrounding wastes.

Whilst the saliniferous soil has not originated the formation of an argillaceous salino-terrene devoid of vegetation, and it being probable—although I do not assert it from absolute observation—that the groups of JUME find the necessary conditions to enable them to struggle constantly for life, this waste is covered with boskets, or with heaths. The former consist of ALGARROBOS with some *Retamas* dispersed among them, as trees or bushes; some BREAS likewise form among them the loftiest elements of the coppices.

The ALGARROBOS in general, prefer a sandy-soil, and are found in the dunes or sand-banks, for instance, near Pilciao in the district of the Fort of Aldalgala; the natural heaths choose a stony-soil. This ligneous waste consists of the vegetables already mentioned, and its composition is modified in different ways, because different elements dominate in different parts. Frequently the *Mimoseæ* prevail, and the rarest is the common JARILLA—*Larrea*—or else the different elements are found thoroughly mixed. The altitude also has its influence, although it cannot be calculated with exactitude, on account of the scanty information we at present possess.

The CARDONES—which is the name in these districts of the gigantic species of the genus *Cereus*, and of the abundant *Farilla pispita*—appear rather to belong to the great valleys of the Cordilleras, than to the vast, and most level, fields. In particular the *Cacteæ columni* are found of a considerable hight.

On the heaths the vegetation is poor indeed, scarcely can you see some herbs and *Gramineæ* under the shade of the thickets, which renders the occupation of a pastor miserable enough in those parts. At some places wells and small cattle-farms have been established, but their product is always small and uncertain on account of the irregular rains. I have been told that in the very places where I have not been able to discover even a leaf of an herb, the grass was as high as the knee some years ago; but when I was there, I could only find—after an abundant rain—some plants which began to sprout, and they were simply *Euphorbiaceæ*, *Amaranthaceæ*, some species of *Oxtropis*, with others which belong to every waste and are almost destitute of any nutritive principle, whilst the *Gramineæ* are almost entirely wanting. The want of pastures for the domestic animals, is partly replaced here by the cultivation of maiz, as also by the fruit of the ALGARROBOS, which not only are useful

to man, but also to the domestic animals; nevertheless it is an uncertain crop, and differs greatly in abundance one year with another. As a general rule, the crops of Indian-corn and ALGARROBOS alternate, but if unfortunately the two fail at once, the traveler finds much difficulty in procuring a little nourishment for his horse—or mule—even for a single night.

The high Cordilleras—although they do not always offer grazing grounds to the cattle—are notwithstanding a slight resource for them where otherwise, they would die of hunger. Here and there, between the Monte Formation and that of the Puna, a green and magnificent belt of true alpine-vegetation is found, which, rich in *Gramineæ*, refreshes the sight of the traveler who has just crossed these wastes, and it is also a resource for the droves of cattle.

These descriptions refer to the Northern-districts which I know by personal inspection: in reference to the Southern-regions I have no reliable information, and can only judge from the little we know, that its relations in general, are not the most favorable, although the demarkation as it appears, is not so accentuated on the East.

Notwithstanding it cannot be asserted that these regions are gifted by Nature with many attractions, I will not say, that its resources are not susceptible of a greater development than that which it now offers to us. I believe that above all, the importation of animals better fitted for the desert than horses and cows, such, for instance, as camels, would give to these wastes of ligneous-plants far greater advantages than those they now have; at the same time the oases could be improved by a more rational distribution of the water. More especially there is a great future for the cultivation of the vine here. At those places where it is undertaken with intelligence, and where the water is reasonably distributed, wine is made which can rival the best classes in the world; this I know from experience.

On the Eastern part of this Formation we find forests of QUEBRACHO and ALGARROBO, with high and low brush-woods, which are easily distinguished, but which sometimes are confounded one with another. The white QUEBRACHO—*Aspidosperma*—is one of the most abundant trees in this Formation, and it is absent from very few localities. Sometimes it presents itself as a bush, again as a tree, but it is chiefly found in real-forests on the Eastern limit of this part; that is to say, on the hills and undulated-flats which are spread at the foot of the Sierra of Ancaste. You can travel in forest there for days together, without variation or horizon, and even when you have reached the top of an eminence, you can perceive nothing but a weary and endless plain, of dark-green foliage. Nevertheless, these forests are not exclusively composed of QUEBRACHO, but this is the tree which overtops all

others, and at a glance determines the character of the forest, although it is not found in close contact with its kind. Many thick and compact groups are among them, formed of divers elements, among which we found the BREA, CHAÑAR, TALAS, *Acacias*, and various *Mimoseæ* of different species, *Farillas*, *Bulnesias*, and some others, mixed with *Cacteæ*, *Volumniforma* and *Opuntia*; the soil is thinly covered with herbs and *Gramineæ*, which are quite-well grown in the rainy-season. If the use of the timber for building cabins and fences, and as fuel, and the value of the fruit of some of the *Mimoseæ* for the animals. be excepted; the benefit to these animals of these herbs and *Gramineæ*—poor as they are—is the only practical advantage to be derived from these forests.

The habitations of man are found on the driest places, under the scattered ALGARROBOS; woods of these ALGARROBOS are entirely wanting here, and these trees are entirely isolated. Therefore these localities are chosen by the settler in preference, inasmuch as he is saved the expense of clearing the forest. The soil around the ALGARROBOS is generally bare; only on the shady sides some herbs are found.

Nevertheless, this is not the constant character of the groves of ALGARROBOS; at some places the distance which separates the trees is much greater, and then swards of hard *Gramineæ*, with some bushes, are produced; yet again, in other places, they form thickets in which the ALGARROBO is not as lofty as the QUEBRACHO; therefore a bosquet of ALGARROBOS appears to be more homogeneous than one of QUEBRACHOS. This character is specially distinguished in the ABGARROBO forests of the Eastern part.

Tall trees are wanting in the thickets, but these form a compact and impenetrable mass of arborets and bushes, principally composed of TALAS and *Acacias*, with some smaller shrubs. The soil is covered with a small number of herbs, mixed with scanty *Gramineæ*.

The low and more open boscages are composed of a greater number of elements. Many bushes and climbing-plants already mentioned, seek the air and the light, and therefore are not met with, save in the open places or thin-thickets, which present a very varied composition according to the nature of the soil where they grow. These bushes are frequently found at great distances from each other, differing much in hight where the soil is covered with sward, or else they are more compact, and then are as high as a man. Sometimes these elements are mixed; sometimes one of them predominates; and, again, one species alone will be found, which then gives a characteristic name to the locality. I will only mention the following as examples: *Roleo farilla*, *Prosopis humilis*, and *Baccharis lanceolata*; the latter is found in the thickets of the shores.

In these forms or types of the Monte Formation, certain elements also appear, which, influenced by chemical or physical agents, differ more or less in their nature from the preceding, but which ought to be considered nevertheless, as appertaining to this Formation, that not only contains them, but also includes other allied elements; I refer to the systems of the Sierra of Córdoba and the salt-deposits.

With that of San Luis, the Sierra of Cordoba includes a system parallel to, and isolated from, the Cordilleras, which rise to the height of about 7,000 feet. Certain phytographic regions may be distinguished, which correspond to the successive heights above the the level of the sea, according to the exposure and the inclination of the slopes. On the precipitous declivities of the South-side, the forest is higher than on the North-side. The more gentle slopes and table-lands—almost level—are generally covered with green-sward, and form true Pampas, which name they also bear. The woods consist in part of the same elements as the Monte Formation, but at the same time present some characteristic elements which are wanting in the true Pampa; I mention the MOLLE Á BEBER and the COCO as the commonest Even when the woods have ceased, the COCO is yet seen on the slopes by itself.

After the woods, a region of brush-wood generally succeeds, specially formed by *Synantereæ*, for example, the *Heterothamus brunioides*. Professor Hieronymus has observed, moreover, in some localities of these mountains, a region of the *Polylepis racemosa*, called here TABAQUILLO. Thereafter, the alpine-pastures are met with, which are more or less abundant, according to the altitude and the constitution of the soil; they extend to the woods, and dispute the soil with them where the surface is level. Some thickets struggle for space with the trees, and partly replace them; for instance, those composed of the *Flourencia campestris* and the MANZANILLA—*Ruprechtia*.

The salt-deposit presents a different character, according to the quantity of salt which the earth contains. The most saliniferous points which in part are deposits of pure and compact salt, are utterly divested of vegetation; the saline-vegetables, as the *Grahamias*, *Quenopodias*, etc., plants slightly compact, come next to these. Nevertheless, at various points they even form brush-wood more or less thick, and of considerable hight. On the edges of the Salines the number of species augment, and some elements of the Monte Formation, such as the *Gramineæ*, are found there. The predominance of some species gives a particular character to certain points, for instance, the CHAÑAR, and some species of *Prosopis* with spiral points. The edges of these Salines provide excellent pastures during some months of

the year, whilst towards their centres only the guanaco, tiger, and ostrich are found.

As a response to the question, "What can we expect from this Formation in the future?" we ought first to observe, that the plain does not offer to the agriculturist the same flattering expectations as other districts, notwithstanding its fertile and virgin-soil, on account of the irregularity of the rains. Cattle will always be the basis of prosperity here, with which a lucrative commerce can be carried on with other districts and countries, by an exchange of commodities. It cannot be doubted that this branch of industry will be much improved, or that, by a rational explotation it could produce better results than are obtained at present.

From the botanical point of view, I especially call attention to the improvement of the pastures by the dissemination of the better species of *Gramineæ*. By a series of experiments practised with intelligence and perseverance for some years, it would be ascertained which are the best species to recommend for this purpose.

The soil produces extraordinary harvests at all those places where water is not scarce, or where the mountains give rise to streams and rivers. By constructing aqueducts, as the Jesuits formerly did, and as some intelligent proprietors have lately commenced to do, the waters can be rendered of great use, and many square-leagues which are now covered with unproductive scrub-wood, could be transformed into fields of wheat and lucerne. The vallies of the Sierras possess all the conditions required for the cultivation of fruit-trees, tobacco, and medicinal and dye-plants, whilst the mountain-pastures are superior for the raising of cattle and the production of cheese and butter, as in the Swiss and German Alps.

VII. Sub-tropical Formation.

This Formation is the garden of the Argentine Republic, and presents to us landscapes of such magnificence and fertility that the traveler is enchanted. The fact that he only reaches them after crossing sterile lands in which it is not possible to trável without much trouble, only renders the contrast greater.

This region exists owing to the high ranges of the Cordilleras and their branches—to them also belongs the chain of Aconquija—which detain the winds that come from the Atlantic Ocean, charged with humidity, and precipitate it as water upon the Earth. These waters form the numerous rivers and streams, which run at the foot of these mountains and cross a considerable portion of the

plain, and provide those localities besides with rain and mist, thus nourishing the splendid vegetation I will now attempt to describe. Consequently this vegetation cannot exist except in those regions where; 1st, the mountains are sufficiently elevated to attract the humid atmosphere and stop the winds; and 2nd, where they are directly in the way of the damp winds. At those points where they have not sufficient hight—which I believe to be about 10 to 12,000' — or where other mountains are placed to windward of them so as to cut off the access of the damp-wind, the Sub-tropical Formation cannot develop or else it is very limited. This is proved by the aspect of the valley of the river Las Talas, where to the Eastward, in front of the Sierra of Aconquija, the Sierra Candelaria—as this group of mountains may be called—is situated, and where the sub-tropical woods are only seen on the slopes, whilst in the depths of the valley the Monte Formation appears; yet nevertheless the Eastern-shed of the Sierra Candelaria is adorned with a magnificent tropical forest. The very-wide vallies of the river San Francisco and of the Campo Santo, which spread between the Cordilleras, the Sierra-Chica of Salta, and the mountains which are found on the Map under the names of Sierra de la Lumbrera, and Sierra del Maiz-Gordo, are alike covered with a formation which belongs to that of the Chaco, with its arborets of *Bougainvillæas*, *Pereskias*, and many other peculiarities, and serve as another example of this law.

It is not necessary to use many words to explain that the Sub-tropical Formation is only found on the Eastern water-sheds of the mountains, whilst the Western are wastes. No humid-wind ever reaches them because the mists of the East are attracted by the Eastern slopes of the high Sierras like Aconquija, and the Western water-shed of the Andes detains those from the Pacific Ocean. Consequently, where the lower lands comprehended between the principal chains of the Cordilleras and its branches, are found, we meet a formation which we already know as the Western zone of the Monte Formation; on the contrary, however, at those points where elevated plains exist in the same mountains, we find the Puna, which we will soon describe.

On the North the Sub-tropical Formation passes into the Bolivian tropical-forests, which clothe the Eastern water-shed of the Cordilleras. I have denominated this formation "Sub-tropical" although it extends to the very tropics—I have followed it to 21° 30' Lat. Nevertheless, these woods do not show here the character which we call tropical, but are composed of the same elements which we have observed on the mountains and their slopes of the Province of Tucumán, mixed with some other new species. The manner in which the transition to the true tropical forest is effectuated at about 19°, is not yet known.

In the description of the preceding Formations I commenced by an enumeration of their elements, before dividing them into their sub-formations. It appears to me to be better to begin the description of the Sub-tropical Formation, by first dividing it into sub-formations, then to terminate with the revision and enumeration of the principal elements of each one. Inasmuch as this Formation appears in the water-sheds of the mountains, its divisions are much more accentuated, and its elements more diverse.

Thus, as the description of the Monte Formation obliged me to make a superficial sketch, on accouut of the reduced space at my disposal, so also—in a greater degree—the vast richness of this Formation compels me to limit myself to a relation only of its principal features.

The regions which can be distinguished are the following :—

The centre, is founded by the sub-tropical woods marked on Map 2. "Monte sub-tropical." It clothes the lower portions of the slopes, and extends with some exceptions—which I will soon mention—to a hight of about 3500 feet. Towards the plain it forms a landscape similar to a park—thus marked on my second Map—on account of the melange of groups of trees and thickets, with the lawns which cover the slight undulations of the surface. Magnificent pastures are found here, with a thick-sward of splendid-green *Gramineæ* interspersed with groups of woods, which partially present the same element as the water-sheds; partially also other species of trees are seen, different from those; and in other places thickets appear that are made of somewhat various elements among which the *Compositæ* generally predominate, and are in part more uniform, consisting principally of scattered arborets of *Mimoseæ*.

The following portion is formed by a more arid zone that extends towards the plain, the prevailing tree of which is the CEBIL, and gives to it the name of "Zone of the CEBIL." Other *Gramineæ*, which already form more scattered tufts, and herbs are also found here, which are much scarcer—or rather are completely wanting—in the Park. The wood which is found here principally consists of CEBIL, and it also shows open spaces frequently of vast extent—in which not a single tree is seen, save where the CEBIL is replaced by a small-Palm.

A third portion is called from its characteristic tree—which according to my judgment—also belongs to the Sub-tropical Formation—the "Zone of the QUEBRACHO COLORADO." It constitutes a true zone of transition, in which the elements of the Monte Formation penetrate a considerable distance; particularly the QUEBRACHO BLANCO, which is wanting in this zone, as well as in the Subtropical Formation, but here frequently accompanies the QUEBRACHO COLORADO. The only motive which obliges me to consider this

zone as belonging to the Sub-tropical Formation, is that the tree which characterizes it, is even found in the tropical forests, whilst with the exception already mentioned—it is wanting in the Monte Formation. Moreover, this magnificent tree, which is of considerable hight and without thorns, does not correspond to the general character of the Monte Formation.

Let us now pass on from the sub-tropical woods to the tops of the mountains, and see how two other zones extend beyond the last one. In accordance with the predominance of one of their two elements, these zones may be distinguished under the names of "region of the ALISO" and "region of the QUEÑOA."

Over, or alongside them—as we shall see by and by—extends the region of the alpine-pastures, which is rich in *Gramineæ* and flowers, and which delights the sight with its magnificent and agreeable verdure. The lower portion is frequently intermixed at the foot of the mountains, with bushes, but these are also seen on the higher summits. The fertility and magnificence of these pastures naturally diminish where the climate—owing to elevation—is not so favorable to vegetation, and where the slopes are more rocky and precipitous; then, some of the elements of the lower regions disappear and others take their place; yet, I do not think this is a sufficient reason to subdivide this Formation yet again. I mark its limits at the greatest hight of the mountains on the South, and the region of the PUNA on the North.

Let us now examine the elements which compose this Formation. The sub-tropical woods are only met with on the Eastern slopes of the mountains, as I have already said, and in part at their foot. It is difficult to determine the hight which they reach, because it does not depend only on the hight above sea-level, but also upon many other considerations, amongst the principal of which are the situation and the steepness of the slopes. Inasmuch as the predominating direction of the Sierras of the Argentine Republic is from North to South, the direction of the wind is the same, in such wise that it also prevails always from North or from South, along the Sierras. All the winds which are detained by the mountains blow along them, as also up to a certain extent in the plains which extend below; any other direction—save local exceptions—in general being of short duration. The North winds in these regions always bring humidity and heat, and *per contra* the South-winds are cold, thus occasioning the condensation of the mistiness brought by the North-winds. According to my observations, and information derived from the inhabitants of these regions, it is the rule without exception, that the rain is only precipitated when the South-wind blows. It is, therefore, easy to understand that the Southern slopes of the mountains are more humid than the Northern ones, and therefore, the woods on the

South ascend to a higher elevation than those on the North. It is difficult to indicate this difference in numbers, because we have at the same time to call attention to other circumstances; therefore, I will simply record a general impression by stating it to be about 800 feet.

The second influence upon the elevation to which the woods extend, is found in the declivity of the water-sheds. It is the rule, without exception in these mountains, that at all points where the slope is not precipitous, only pastures dotted with thickets are found; on the table-lands trees never exist. It is evident that this fact is frequently in opposition to that which I have just stated, and indeed, whilst table-lands are often found with a Southern exposure and without trees, often on many sharp slopes exposed to the North, trees still exist. The alpine-pastures also generally present a fringe of woods to the ravines, at those points which seem to be placed already above the upper limits of the forest. Therefore, when I say that the limit of the woods is found at about the hight of 3,500 feet, this being subject to great modifications, I mention an approximative measure.

The sub-tropical forest is composed of a great quantity of magnificent and majestic trees, whose foliage gives an agreeable shade without interrupting the light in such wise as to prevent the development beneath them of an inferior vegetation. Arborets and bushes are found between the trunks of the trees, and where the shade is deepest the soil is covered with ferns, whilst where there is more light, some herbs and *Gramineæ*, cover the soil more or less completely. In general the trunks of the trees are covered with *Epiphytes*—the true parasites are rarer—which belong to different families; such as *Orchideæ*, *Bromeliaceæ*, *Cacteæ*, *Piperaceæ*, *Musci*, and *Lichenes*. Sometimes, also, other plants which as a general rule only grow on the ground are met, with upon the trees in the dust which accumulates at the roots of the branches, and thus some trees grow upon others. Gigantic *Lianæ* twine around the trunks, and drop their air-roots to the ground, whilst their branches and trunks cling to the branches of other trees, which they adorn in Spring with flowers of extraordinary magnificence. A traveler who, after having visited the primitive forests of Brazil, contemplated the woods of Tucumán, could do no less than declare that these latter were their rivals in splendor: yet nevertheless, this traveler only superficially knew the woods of Tucumán, which neither in wealth of vegetation, nor in magnificence or variety of forms can be compared to the forests of the North; for instance those of Orán.

The following remarks are almost exclusively based upon the Flora of Tucumán, because the rich collections made in the North are not as yet studied.

I will mention the following as the most common and magnificent trees of the Sub-tropical Formation; the TIPA—*Machaerium fertile*—a tree of splendid-form, whose foliage creates a dense shade. In Spring it is covered with numerous papilionaceous flowers, which produce winged-fruits. It rises to the hight of 150 feet in the narrow ravines of Monteros, where its trunk is elegant and perpendicular, only branching at about 70 feet from the ground. In the more open forests, particularly on the river-shores, it branches at a lower hight, and then has a broad and dense top, whose pinnated leaves cast a grateful shade around.

The LAURÉL—*Nectandra porphyria*—which belongs to the family of the *Laurineæ*, is almost as abundant as the TIPA; it resembles its family both in the leaves and flowers, and is a most beautiful tree, but its crown is less ample. It is generally found in dispersed specimens in the forests, although sometimes it alone forms them, as, for instance, near Lueles or in the Alto de las Salinas. Several species of LAURÉL are known; one of which not yet classified, contains camphor in its leaves.

The NOGAL—*Fuglans nigra*, L. var. *boliviana* DEC.—similar to the European walnut, is a third element of the sub-tropical forest. It produces edible fruit, but the shell is harder. The two RAMOS—white and red—are trees of the family of the *Sapindaceæ;* they have more or less the same form in their vegetative organs as the NOGAL. Their technical names are, *Cupania Uruguensis*, and *C. vernalis.* The CEDAR—*Cedrela braziliensis*, var. *australis*—somewhat resembles them, and on account of its soft and easily-worked wood, is not only of great importance to these regions, but it is already exported. Unfortunately it is exploited with so much negligence that even now it cannot be found near the roads, and the old and large ones are rare. I can do no less here than express the desire—as I have formerly done—that the enlightened Government of our country should pass a law upon forests, and establish schools for the education of specialists, for it is necessary to remember, that, although the wealth of our forests is great, it is not inexhaustible.

The *Acacias* known by the names of CEBIL-BLANCO, CEBIL-COLORADO, HORCO-CEBIL, and some others, constitute new and important elements of our forests. These species are different from the CEBIL-COLORADO which we already know as characterizing a certain zone, and which is also found in the sub-tropical forest, but they are not sufficiently known as yet. The pods of the fruit of some of them cover the ground, and their strong and whitish trunks generally distinguish them from afar.

We come now to two magnificent species of *Myrtaceæ*, the MATO and the ARRAYAN—*Eugenia Mato* and *Eugenia uniflora*—magnificent trees with myrtiform leaves, and edible-fruit of the

size of a cherry. The MATO prefers the ravines and precipitous-slopes; it frequently has a very slender-form, and is easily recognized by the brownish-green of its smooth bark. I ought also to mention two species of *Myrsine*—*M. Floribunda* and *M. Marginata*;—the latter, according to Prof. Hieronymus, is not *Marginata*, but a new species. The first is called PALO DE SAN ANTONIO, and the second -- LANZA-BLANCA. This last, with its lower-trunk, is already a form of transition to the less-developed woods of the Park district. Among the other trees of great size, I will only mention the PALO BORRACHO—*Chorisia insignis*—a *Bombacea* with a swollen trunk, covered with blunt quadrangular thorns; the leaves are digitated, the flowers large and white, and the fruit full of a species of white-cotton, of little-coherent fibres, which on this account is only used for making lamp-wicks. The form of this tree is one of the most singular that can be seen in this country.

A species of PENTAPANAX — also called at the time of flowering the PALO DE SAN ANTONIO, rises majestically in the primitive forest, but it is smaller in less shady places. Two species of *Bignonaceæ*—LAPACHO—also adorn the Northern woods and belong to the genus *Tecoma*. It would be almost impossible for the vegetable kingdom to present a more imposing spectacle than these gigantic trees, when their branches — dark and leafless during the winter—are crowded, in spring, with millions of yellow or rose-colored flowers which precede the sprouting of the leaves. Another species — probably different—is found near Tucumán; it is not so high, and prefers the zone of the Park to the real-forest.

The Northern-forests present in addition, a considerable number of high-trees, which have not been as yet, sufficiently studied. I will only mention the following: the URUNDEY; the QUINA-QUINA, which gives an aromatic resin, and is almost exclusively found in an exterior zone to the sub-tropical woods; the CASCARÓN, a high *Leguminosa;* the ROBLE, which, judging from the leaves, is also a *Leguminosa* with a red and lustrous bark; the MORA, whose fruit is edible; the TATANÉ, which has a piquant juice in its bark; the ESPINILLO — different from that in the South—a magnificent tree of the family of the *Leguminosæ*, easy to distinguish from the other species from the absence of thorns; the PALO MORTERO, very similar to the TIPA;—the PACAY—*Inga Uruguensis*;—the SUIQUILLO; MAYANA ITARA; another SOMBRA DE TORO; and some others which will be classified as soon as their flowers and fruits are known.

All these trees, like the smaller ones which we will soon enumerate, furnish most valuable timber, each one with some certain quality for certain uses, such as building, turning, etc. At pres-

ent, only the inhabitants make use of them in their crude arts, whilst many articles—such as furniture—for which no better materials than those on the spot could be found, are yet imported from Europe and the United States. In the future, with the increase of population and the improvement of manufactures, these woods will become a real treasure, supposing that the forests be taken care of and not destroyed by carelessness. Moreover, they are of the highest importance for their influence upon the climate. To devastate them would transform into a desert an important part of the country, which is now considered as its garden. Want of space prevents my entering into details about the industrial uses and the properties of these woods; Professor Hieronymus has published some details about them in the Bulletin of the National Academy of Sciences, I.-IV.

I will only mention the following, among the smaller trees, which, with those already named, compose the sub-tropical forest, or else, as in some localities—for instance, the Eastern-slopes of the Sierra which bears the name of Candelaria in my Map—almost entirely substitute them. LANZA-BLANCA--already spoken of—and LANZA-AMARILLA, a *Combretacea* of the genus *Terminalia*; the ZAPALLO-CASPI, is a *Pisonia* of very porous wood abundant in ashes; the DURAZNILLO-BLANCO, a species common in the North, but as yet insufficiently known; the CORONILLO is as yet undetermined, because its flowers and fruit are unknown; its bark is covered with formidable-thorns, and it is similar to the VIRARÚ—*Ruprechtia excelsa;*—the CHALCHAL—*Schmidelia edulis*—with edible berries; the RUNACASPI—*Achatocarpus nigricans*—which is frequently found under the form of a bush; the *Erythroxylon ovatum*, known in the North under the name of COCA DEL MONTE; the *Randia pubescens*, also sometimes a bush; the *Rosacea*, *Kageneckia amygdalifolia*. We also find some arborescent *Solaneæ*, as, for example, the *Iochroma arboreum*, the *Solanum pulchrum*, the *Solanum verbascifolium*, etc.; then an arborescent *Urticacea*, *Urera boerifera* with burning-leaves very characteristic of these forests; its leaves are gigantic, its flowers of a clear-red color, and its berries white; it does not generally surpass the hight of a man, and renders very difficult all transit of the woods, yet in some favorable places it reaches an elevation of some 30 feet; some species, also, of the genus *Croton*, form bushes in Southern districts, but a species is found in the North as quite-a-high tree. We also find in these forests, various species of trees which are not met with at the South, and which have not yet been classified. Some of them are splendid trees, for instance, a beautiful *Melastornacea*, a species of the genus *Cinchona*, with great white flowers, etc.

The wild Orange ought to be considered as one of the principal elements of some of these forests; it, doubtless, first appeared from some transported or lost seeds, and has become wild. The MOLLE of Córdoba—*Lithrea Gillesii*—is only found in isolated specimens, near the Cuesta de Juntas. The COCO, another tree—which, as we have formerly said, characterizes the mountains of Córdoba—is also found here, where it is called COCHUCHU; it appears as a fringe to the superior confines of the sub-tropical forest, which it is almost exclusively composed of this tree, together with some bushes; this fringe might be considered as a separate zone. I add a columniferous *Cactea*, some 20 feet high; it grows specially in the steep-rocks, and analogous situations, as in the valley of Juntas, together with some *Bromeliaceæ*.

Some hard-wood aborescent species may be distinguished among the bushes which grow under the most elevated trees of the sub-tropical forest; generally they have solid and small leaves, whilst other species are softer, not so ligneous, and with broad and large leaves, which constitute them an ornament of the woods. Three species of the first group are, on the contrary, the pest of the forests; viz., two species of TALA and a GARABATO, which, with their thorny branches, hinder entrance to the woods, or at least render it very difficult. The TALAS belong, with those of the South, to the genus *Celtis*; these *Ulmaceæ* are called *Celtis Tala* and *Celtis acuminata*. On the edges of the forest, in some places they are found in union with the TALA-BLANCA, which, on account of its general form and leaves, appears like a true TALA, but which, notwithstanding, does not belong to the genus *Celtis*, and is called *Duranta Lorentzii*.

The GARABATO is a *Mimosea—Acacia Tucumanensis*—with curved sharp thorns, which are extremely difficult to extract from the flesh. A variety of this species—var. *subscandens*—is found approaching the aspect of a climber-liana, which clings to the trees. The TALAS sometimes also show this tendency to transform themselves into lianas. In the North, some more species of TALAS exist, one of which is called GATEADORA. Among the arborets I will, moreover, mention the magnificent *Piperacea*, called *Enckea Sieberis*, and the *Pisonia hirtella*, whose fruits appear like burrs; the *Abutilon niveum*, of twice a man's hight, and with large and white flowers. The Northern-forests present to us a greater variety of bushes, which have not yet been studied. Finally, I cannot forget a species which is found in the primitive forests, especially in the deep ravines; it is a *Graminea—Chusquea Lorenziana*—about 18 feet high, but which in some favorable situations reaches 30 feet. Its shoot is solid, and is much used by the natives for various purposes.

I will mention the following bushes of the second group indi-

cated: *Phytolacca Bogotensis*, *Celosia major*, *Chamissoa celosioides*, *Acalypha cordifolia*, *Phenax urticifolius*, *Bœhemeria caudata* and some *Solaneæ* which are very common. The study of the collections which have been made in the North, will make us acquainted with many new species. So also many climbing plants which are wanting in the forests of Tucumán, present magnificent forms in the Northern regions. The largest species belong to the family of the *Bignoniaceæ*, and their sprouts are frequently produced of an extraordinary diameter—relatively speaking—to those of other species of this family. The common name of all these greater climbing plants is VEJUCO, whilst the small ones are called ENREDADERAS; in the Province of Tucumán various species are known by the name of SACHA-HUASCAS. *Sacha* is an Indian word, which signifies "indigenous;" it therefore has the same meaning as "del campo"—field—by which the Gaucho indicates that a plant is not cultivated, but wild; and that it does not belong to the genuine species esteemed for its properties, but a similar, yet false species. These plants are used as cords or lines, and in place of strings of hide in the construction of the roofs of the "ranchos."

When we say, that the most beautiful and magnificent of the *Lianas* belong to the family of the *Bignoniaceæ*, we do not mean that they are limited to this family; on the contrary the *Lianas* represent various families, not only in our country but in all others where they are found. The pretty *Canavalia gladiata*, which the people call TRIPA DE FRAILE, the same as some other climbers; the *Desmodium adscendens*, the *Cologonia australis*, the *Rhynchosia melanosticta*, also belong to the *Leguminoseæ;* the *Tragia volubilis* and *dodecandra* to the *Euphortiaceæ;* the *Heteropteris glabra* and the *Janusia guaranitica* to the *Malpighiaceæ;* the *Serjania fulta*, and the *S. foveolata* to the *Sapindaceæ;* the *Prasopepon cucumifolius* and *Cyclanthera tamnifolia* to the *Cucurbitaceæ*, etc. This last family presents a vegetable to us—the *Sycios montanus*—which requires a special mention on account of its abundance in the sub-tropical forest. This species is very common and is not limited to the sub-tropical woods, but extends to the zone of the QUEÑOA, and frequently clothes the trees to their very tops with a fantastic and infinitely varied foliage; it also covers the slopes and chokes the more debile herbs. It withers at the beginning of Autumn, when its brown-color and thorny-fruit are as ugly, as its flowers and leaves were beautiful to the landscape, during Summer. I will still record here various climbers which, nevertheless, prefer the zone that I have called the "Park," and which are only seen on the borders of the high-forest of the Sub-tropical Formation; viz., two species of the genus *Clematis*, the *Boussingaultia baselloides*, the *Cissus Twediana* with clear-

red flowers, the *Cardiospermum Halicacabum*, the *Paullinia brachystachya*, the *Rubus imperialis*, called here MORA, whose fruit is edible, and, finally, some *Passifloreæ*. The *Mikaniæ* which predominate in the Monte Formation, are rare enough in the Subtropical Formation, and are completely lost in the true-forest. The *Salpichroa rhomboidea*, a common species of the Monte Formation, is also a climber, and we ought also to mention the genus *Blumenbachia* because it constitutes a true ornament of the heaths. The *Echites funiformis* is very common; this species belongs rather to the formation of the "Park;" its flowers are large, white and highly aromatic. Various species of the family of the *Convulvulaceæ* are also quite common, and particularly adorn the fences with their pretty flowers; in aspect, the *Manettia leianthiflora*, whose flowers are of a bright-red color, resemble them, and also by affinity some species of the genus *Cuscuta*. One of the most beautiful of the *Monocotyledones* is the *Bomaria fimbriata*, whose flowers immediately attract attention, whilst the *Bredemeyeriana* is one of the forms of the woods of ALISO. The species called SANTA-LUCIA — a *Commelyna*—sometimes in the fences, resembles a climbing plant, and the *Smilax campestris* is not rare in the woods; its thorny and tough branches are one of the principal obstacles which the hunter finds in his way. The *Dioscorea glandulosa* is not wanting here, but it is rarer.

Let us yet cast a glance at the epiphytic vegetation which lives on the trunks of the trees. I have, heretofore, indicated the families to which these *Epiphytes* belong, the most abundant of which are: some *Orchideæ*—two species of the genus *Orcidium*—the *Bromeliaceæ*, various species of the genus *Tillandsia* with large and beautiful flowers, and the *T. usneoides*, pendant from the high-trees like a long-grey beard particularly in the zone of the QUEÑOA; the drooping *Cacteæ*, in special three species of *Rhypsalis*, the one, cylindrical, the other, flat, and the third, trilateral; the fruits of these three species are edible. There is one which is not pendant, but clings to the trunks, and which rather belongs to the zone of the QUEBRACHO-COLORADO. The *Polypodiaceæ* are very numerous and of elegant forms; viz. the *Polypodium areolatum*, *P. incanum*, *P. macroparpum*, *P. ensifolium;* finally some species of *Peperomia* are not to be forgotten. The *Musci* and *Lichenes* are more numerous in specimens, than in species, and cover the trunks of the trees; in some localities their enormous quantity is characteristic, for instance, in the upper part of the ravine of Monteros, where the woods almost exclusively composed of MATO, are covered with an immense quantity of pendant *Meteoria* and *Pilotrichellas*. Nor are magnificent forms of *Lichenes* wanting, especially of *Stictas* and *Cetrarias*, which predominate on the

North, whilst the zone of the QUEBRACHO-COLORADO is characterized by a clothing of Usneas.

The reduced number of true-parasites of the family of the *Loranthaceæ*, cannot be mentioned here. Herbs are infrequent here on account of the shade of the trees, which, although it does not impede all herbaceous vegetation, is nevertheless, the cause of its relative poverty. I will mention some characteristic species.

Above all two Ferns attract our attention, about the hight of a man, but yet not reaching the form of a tree, and they cover, over a vast extent, the shaded soil of the sub-tropical woods. Their technical names are *Pteris deflexa* and *Davallia inæqualis*. At the bottom of the dark-ravines which hide themselves in the shade of the forests, a great quantity of magnificent Ferns are found, but which do not require specification in this general sketch.

It is an interesting fact, however, which ought to be recorded, that of the species obtained in my voyage, one third part is composed of vegetables new to science, but of the Ferns on the contrary, there is not a single new species in our Republic.

Some species of *Gramineæ* merit special mention among the plants which are found under the shade of the forests; they have long and soft leaves, very different from the hard, narrow, and keen-edged species of the Pampa. These species at first sight of their forms show all the difference of climate; viz. *Muhlenbergia diffusa*, *Digitaria marginata*, *Orthopogon loliaceus*, *Panicum oblongatum*, and the *P. enneaneuron*.

In this dense-shade not many beautiful flowers are to be found; the only ones worth mention are a *Begoniacea*, the *B. micranthera*, and the *Gloxynia gymnostona*. The *Petiveria alliacea* is a characteristic plant of this Formation, for which the inhabitants are not thankful, because it gives a disagreeable taste to the milk of the cows who eat it.

I will still mention the following as characteristic and common plants: the *Gomphrena elegans*, *Pavonia spinifex*, *Elephantopus scaber*, *Acanthospermum hispidum*, *Heterospermum rhombifolium*, *Chætothylax umbrosus*, *Plagiacanthus racemosus*, *Dicliptera Pohliana*, *Cyperus Luzulæ*, *Scirpus crinalis*, *Herbertia euryandra*, etc. Of the *Cryptogames*, I will cite the pretty *Selaginella jungermannoides*, which commonly covers the shaded and damp stones, sometimes accompanied by a beautiful species of the genus *Hypopterygium*. The *Musci* are more numerous in individuals than in species, and the bryologist would look in vain for representatives of several genera, which he might have expected to find there.

Let us now examine the sub-tropical Park, which is found as much on the plain at the foot of the mountains as in the vallies

on the easy slopes; for instance, near Siambon. The Park is distinguished from the forest by the alternate existence of groups of woods, thickets, pastures and scattered bushes. The undulations of the surface cause this difference in the vegetation, which would be ever more marked, had not man modified the primitive relations in different points. This Park is the real garden of the Republic, and fit for every species of cultivation. In the future, farms and country-seats will certainly cover it, and cities and villages grow up where now graze the flocks. The present explotation of this fertile-soil is very primitive; nevertheless, the cultivation of maize, rice and sugar-cane, is very productive, and the orange-groves of Tucumán, are already known beyond the Ocean.

In general, the species which form the groves are the same we have found in the forests; I do not believe that a single one of them be wanting, but we find, moreover, other trees which are not in the forest, but which prefer the lighter groves of an isolated location. I will mention the following species: the LECHERÓN—*Sapium aucuparium*, var. *salicifolium*—*Porliera hygrometrica*, which we have also found in the Monte Formation, but which here bears the aspect of a tree, and is called CUCHARERA. The GUAYACÁN of these regions is the *Cæsalpinia melanocarpa*, which is specially found near the limits of this Formation, whether to the regions of the CEBIL, or to that of the Monte; the PACARÁ—*Enterolobium Timbavica*—whose fruit and bark give a natural soap; the *Carica quercifolia*, called HIGUERITA, from the resemblance of its leaves to those of a fig-tree; the TARCOL—*Jacarandá chelonia*—a popular remedy for venereal diseases; the CEIBO—*Erythrina cristagalli*, probably—which adorns the landscape with its large red flowers; the SOMBRA DEL TORO, a species of *Myoschilus* with savory and edible fruit; the LAPACHO of Tucumán, as we have heretofore seen, rather belongs to the Park than to the Forest.

An increased number of arborets which grow among the higher-trees of the forests, or cover the soil or skirt the open spaces, might be cited here as exclusively or principally belonging to this zone. Some species of *Croton* are generally found in the pastures of the vallies and slopes; viz. the *Croton Tucumanensis*, var. *oblongatum*; the *Collæa Argentina*, on the river-banks; the *Cæsalpinia Gilliesii* ornaments the fences and thickets, and in the same sites some *Cassias* are seen, such as the *Cassia bicapsularis*, var. *eriocarpa* and *hirsuta*; the *Mimosa sensitiva* can be included among the arborets, on account of its ligneous structure, although it is not as high as a man. The magnificent *Jussiaea Peruviana* adorns the streams and rivers: the *Sambucus Peruvianus*, belonging to the zone of the ALISO, is also

found here; the splendid *Cricothammus Lorentzii*, in union with other elevated bushes, replaces the woods on the Western slopes, and in other places a similar arboret with yellow flowers is seen, which perhaps belongs to the same genus. The *Nicotiana glauca* abounds in this region, especially on the borders of the streams, and the *Lycium cestroides* forms elevated thickets, which attract a large number of humming-birds. The *Cestrum pubens* and the *Cestrum Lorentzianum* beautify the meadows of the vallies, where are also found the *Acnistus arborescens*, sometimes as high as a tree, and the *Acnistus parviflorus*. The *Solanum crispum*, var. TOMATILLO, is common in the arid-sites, whilst the PALO-BLANCO—*Solanum verbascifolium*—in hight appears to be a tree, and is an ornament to the woods.

Two magnificent species of *Tecoma*, the yellow — *Tecoma stans*—and another with red-flowers, as yet undetermined and quite high, show themselves in the fences, accompanied by a *Senecio* with great leaves and flowers, and twice the hight of a man; the latter is a characteristic plant which indicates to the traveller that he has reached Tucumán. The *Tournefortia elegans* frequents the thin-heaths, whilst the *Phacele acuminata*, an arborescent plant, and some *Labiatas*, viz., the *Hyptis canescens*, the *Hyptis verticillata*, the *Minthostachys mollis*, the *Salvia rhinosima*, var. *arborescens*, etc., prefer the edges of the streams and the woods. Different *Lippias* ornament the meadows and heaths.

All the species mentioned are bushes which more or less belong to the sub-tropical woods, but there are two classes of thickets which consist only of bushes, and characterize sterile localities. One of them is a mixture of different arborets which we already know—as, for instance, the TALA—and in which the *Compositæ*, particularly of the genus *Baccharis*, often predominate. They are found in preference on the undulating or slightly-mountainous lands, and on the gentle-slopes, such as the Southern border of the Sierras of Candelaria and of Tucumán, and in some analogous localities in other vallies. The vegetation of the shores also generally consists of bushes, among which the species of *Baccharis* prevail, such as the *B. serrulata*, *B. amygdalina*, *B. dracunculifolia*, *B. effusa*, etc. The other class of thicket is determined by the *Mimoseæ*, which occupy the dry-localities and the summits of the hills; they form more or less thick brushwood, or rather they are found at short distances from each other. One of the commonest species is called TUSCA—the *Acacia moniliformis*—whose pods are a food sought by the domestic animals; another is the ESPINILLO—*Acacia Cavenia*.

Returning to the meadows of this zone, the magnificent and smiling verdure enchants the traveler who has just crossed the

waste portions of the Monte Formation. The green sward is principally composed of a single *Gramineæ*, the *Paspalum notatum*, a species which forms a slightly elevated and thick turf, and is an excellent food for the cattle, particularly in salty-lands; at those places where the ground contains less salt—as Jujui, for instance—the nutritive value of this species is much less. This plant covers the plains, the low-lands, and flat portions of the wide-vallies, and where it predominates only a reduced number of other species are seen; as soon as these increase in abundance —replacing the *Paspalium*—it may be said that the soil is less fertile. Nor are many herbs of other species seen in these pasture-grounds. I will only mention the most characteristic: the *Kyllingia triceps* is very common there, as well as the *Cuphea hyssopifolia*; some thorny species of the genus *Solanum*—*Solanum claviceps* and *sisymbriifolium*, with magnificent flowers, call attention, whilst another species with large yellow fruit is a real ornament in Autumn. Various large species of *Senecio* are not rare, and the presence of some *Malvaceæ*—for instance, the *Sphæraloea rhombifolia*—sufficiently declare the sterility of the soil. The *Mimosa sensitiva* has already been mentioned. The *Baccharis coridifolia*, vulgarly called the Ñio-ñio, is a detestable plant, because it is poison and noxious to animals; nor is the *Nierembergia hippomanica* scarce.

The plants which mix with the *Paspalum* are much more numerous in the vallies than in the plains; I could cite a long series, but owing to my reduced space, I must limit myself to those already mentioned.

Upon the hillocks, where the *Acacias* sufficiently indicate the aridity of the soil, and where a great number of Viscachas stir the earth in making their holes, the gramineous-sod is replaced by a poorer and less elevated herbaceous vegetation, composed of *Gomphrenas*, *Euphorbiaceæ*, *Oxybaphus*, etc., among which a large species of *Caladium*, with voluminous bulbs, is distinguished at first sight. The vegetation around the city of Tucumán is in part like this, and some travellers who had cherished great hopes respecting the luxuriance of the Flora which surrounds that city, have been in some wise undeceived.

To terminate this Formation I will yet call the attention of the reader to the characteristic Flora of the waters, which are conveyed in aqueducts over the cultivated plains, or which form lagunes in the meadows. Large species of *Cyperus*, which for the most part have not yet been determined, are found in them; besides also the handsome fern—*Gymnogramma trifoliata*; and in the marshes, which are visited during Winter by an enormous quantity of aquatic birds, abound the *Pistia stratiodes*, and the *Azolla Magellanica*; *Wolfias* and *Lemnaceas*.

This sketch, concise as it may be, is already too long, and we must abandon the Park, to consider for a moment the zone of the CEBIL.

The *Acacia Cebil*, the tree which characterizes this zone, is one of the most useful of this country, on account of its bark so rich in tannin; it is a real treasure to the Republic. At the same time it is almost the sole tree of this zone, as in the forests of CEBIL, only the GUAYACÁN and some bushes are seen. The herbaceous vegetation principally differs from that of the Park, in the fact that the *Paspalium* is replaced by another species of *Gramineæ* which assimilates to that of the Pampa, and presents itself in isolated tufts with long and thin leaves. The species yet wants a scientific name. To this can be added some other herbs which are not found or are scarce in the Park, but which in part have not yet been studied; I will only cite here the *Plumbago scandens*, a *Solidago* with yellow-flowers, probably the *S. linearifolia*, a species of *Pterocaulon*, the *Hysterionica subvillosa*, the *Lippia turnerifolia*, var. *camporum*, etc.

The presence of these characteristic plants caused me to extend the zone of the CEBIL in this description and in the Map, to points where in reality not a single one of these trees be found. But there is an another reason for this. It is generally known in Tucumán that the CEBIL forest formerly reached nearer to the city, and that an excessive explotation drove back the line of this tree to a far greater distance. The Gaucho barks the tree only to the hight at which he can reach with commodity. The tree dies, and both the bark of the upper portion and the timber are lost. Is it possible to operate with less judgment, and destroy with greater prodigality the resources of a country? Is it not time that the Legislature occupy itself with this question? especially when it is so much the more inexcusable in view of the fact, as given by the testimony of the *estancieros—ang.* cattle-breeders—that this bark is renewed with rapidity and facility, should a strip of it be left along the trunk.

I therefore suppose that all the land which at present extends as Pampa to the East of Tucumán, was formerly covered with forests of CEBIL. I have already observed that on those lands which present the same herbaceous vegetation, the CEBIL is sometimes replaced by a small Palm-tree, which does not appear to be the same species as that found in the Monte Formation, nor identical with another dwarf-Palm, found in some localities of the Province of Santiago del Estero, but which is not yet determined, for want of its flowers and fruits. It is found, for instance, in Barrealitos.

I have little to say about the zone of the QUEBRACHO-COLORADO. Its technical name is *Loxopterygium Lorentzii*; it is a

high and magnificent tree with a slightly dense crown. Its feathered leaves have a penetrating odor, and it is said, that their prolonged contact with the skin produces an inflammation. Its flowers are little apparent, but its red and feathered fruit as well as its leaves, at some little distance bring to mind off the autumnal Sorbus-tree of Europe. The timber of this tree is much used, and is at present a valuable article of commerce.

The other elements of the forest are those of the Monte Formation, or such as this holds in common with the Sub-tropical Formation, as, for instance, the TALAS; but I might mention as yet the frequency of the MISTOL—*Zysiphus Mistol*—whose fruit is edible, and whose bark serves as soap. I have also found it in the Monte Formation, where it penetrates to a greater distance than the QUEBRACHO-COLORADO and is even sometimes found isolated in the Park.

We will now examine the mountains and study the zones which they form above the sub-tropical forest. In the first place we find the zone of the Pine—*Podocarpus angustifolia*—which is oftener found on the Northern slopes of the Cordilleras, than in the chain of Aconquija. For example this region is very characteristic in the valley of Tarija, and on the Oriental water-sheds of the Cordilleras to the West of Oran, near San Andrés. We find some isolated specimens in the chain of Aconquija, but rarely a sufficient accumulation to enable us to consider it a true zone, as for example in the Alto de las Salinas in the Sierra of Candelaria, where the precipitous slopes above the sub-tropical forest, are exclusively covered with Pine, whilst the gentle slopes present alpine-meadows. This Pine is a well-branched tree of medium hight, and a compact crown; it is not similar to any of the European Pines. The inhabitants of these districts utilize its timber, but for the rest, it is of little importance in the economy of the country. There is nothing characteristic to be indicated in the vegetation which accompanies it.

The zone of the ALISO is something less uniform; this tree—the *Alnus ferruginea* var. *Aliso*—forms a thick and dark forest upon the precipitous-slopes, and in the deep-ravines, and is very similar to the European Alder. The SAUCO—*Sambucus peruviana*—is the only other tree met with here. Bushes among the ALISOS are also rare, being limited to some pretty and high species of the genus *Eupatorium*. At divers places the handsome *Escallonia* is also found, whose hight surpasses that of a man: the *Compositæ* are represented as well, by a few semi-arborets. An herbaceous vegetation exists in the shade, particularly in those sites covered by a thick layer of damp clay, which in rainy seasons makes all the roads inaccessible, because if the mules then slip upon the smooth soil, much less can they climb the steep-moun-

tains. This humidity of the ground also accentuates the physiognomy of the herbaceous-vegetation. I will only mention some characteristic and common species: the *Calignonia glomerata*, which instantly calls the attention of the traveler by its white spotted leaves, that are like flowers; the *Pleroma paratropiorum*, which has here its home, although it passes also to the alpine-meadows; the *Begonia octopetala*, the magnificent *Lobeliacea Syphonocampylos nemoralis*, the climber *Bomaria Bredemeyeriana*, the *Polymonia sonchifolia*, and the *Jungia floribunda*, which are found here, and alongside of the rivulets in alpine-pastures: also the magnificent *Gentiana cosmantha* with red-flowers, a species of *Thalictrum*, some of *Rumex* and a *Valerianea*. The *Gramineæ*—such as the *Muhlenbergia phragmitoides*—are high and thin. The vascular cryptogamic plants are well represented by the Ferns, both in the trees and on the ground, as also by some *Selaginellæ*, *Lycopodium saururus*, and others. A multitude of *Epiphytes* are seen on the trunks, Orchids, *Tillandsias*, Ferns, and particularly Mosses, although the species are not as numerous as the individuals; for instance, a handsome species of the genus *Cryphaea*, and various precious lichens: *Stictas*, *Cetrarias*, Parmelias, and many other smaller forms.

This is sufficient to give an idea of the region of the ALISO whose limits are not easily determined. On the inferior parts of the damp and dark ravines, the ALISO extends to the tropical forest, whilst in some favourable points it rises on the slopes to the hight of about 8,000 feet, but does not reach such an altitude in the bottoms of the ravines. It is not a rare phenomenon to see the ALISO and the alpine-meadows together at the same hight, one or the other dominating according to exposition and situation. We may state the true region of the ALISO to be between 4,000 and 7,000 feet, nevertheless remarking that this is only a general indication.

The zone of the QUEÑOA rises above that of the ALISO, and is separated with considerable precision; the tree which characterizes it is the QUEÑOA—the *Rosacea Polylepis racemosa;*—very knotty and full of branches, its hight is from 16 to 20 feet, and therefore it cannot be called a pigmy. Its trunk is sometimes a foot in diameter, and the wood is very hard; it sheds its brownish-red bark in the form of large scales, similar to dried tobacco-leaves, for which reason it is called by the name of TABAQUILLO in the Sierra of Córdoba; its timber is very useful to the inhabitants of these mountains. It is the only tree in this zone, and is found quite isolated on the open slopes, whilst in the ravines it is more in clumps. It is not accompanied by any characteristic vegetation, but the vegetation of the alpine-pas-

tures is found on the open-slopes, in the intervals between the trees; and that of the zone of the ALISO, in the damp and dark ravines. The white-beard of the *Tillandsia usneoides*, drooping from the branches, is longer and more frequent here than anywhere else.

We will terminate this description of the Sub-tropical Formation, by a rapid glance at the Flora of the alpine-pastures; a zone that can compete, as well with the sub-tropical forest, as with the zone of the Park, on account of the wealth and magnificence of its vegetation, and its picturesque aspect. The products of the cattle-breeding establishments of these Provinces are now articles of export, and, were a rational attention given to alpine-cattle, this branch of wealth could be greatly augmented in the future. Its limits are as difficult to determine as those of the ALISO zone; on the gentle slopes situated on the North, it descends upon the limits which we have adopted for the formation of the high sub-tropical forest, and immediately unites in the vallies with the meadows of the Park, from which it differs by the presence of some other species of *Gramineæ*; viz., near Siambon. In the less elevated branches of the Cordilleras, where, from the absence of wide-vallies or table-lands, the conditions for the formation of the Puna zone are wanting, the pastures become poorer and poorer as they ascend to the highest summits and the eternal snows. In the centre of the Cordilleras it unites with the zone of the Puna, whose limit I place at about 11,000 feet in the free slopes, whilst it lowers much more in the vallies.

The alpine-pastures are naturally limited to the Western slopes and the summits. Their elements generally appear to be the same in the Sub-tropical and Monte Formations; on this account, I have indicated them on the map with the same color, and with so much the more reason, because it would be difficult in some cases to ascertain to which Formation certain among them belong. For instance, very rich pastures spread out between the Monte and Puna Formations, on the slopes of the Cordilleras near Belen, in the valley of Granadillas, to which might be given the name "alpine zone of the Monte." Yet this vegetation is very similar to that of the mountains of Tucumán, and it may be considered as a representative of the sub-tropical vegetation, the other elements of which are wanting.

The principal elements of the alpine-pastures are the *Gramineæ*. Their physiognomy is not that of the thick-sward of the *Paspalum*, but it is more like that of the Pampa, with its isolated groups of tall and narrow-bladed *Gramineæ*. Generally speaking, however, they are closer set than in the Pampa, and do not show such large bare spaces. It seems to be superfluous

to indicate that these relations vary according to the conditions of the climate, and the physical and chemical properties of the soil. The following are the most important *Gramineæ: Bromus unioloides* and *B. Hænkeanus*, *Poa annua*, *Airopsis millegrama*, *Muhlenbergia Cleomena*, *Epicampes cærulea*, *Sporobolus Indicus* —which extends to Córdoba—*Cinnagrostis polygama*, *Nasella cæspitosa*, *Stipa Fchu.*, *Bouteloua tenuis*, *Paspalum Platense et elongatum*, *Setaria glauca*, var. *penicillata*, *Gymnothrix latifolia*, *Cenchrus myosuroides*, *Andropogon condensatus*, *Sorghum nutans*. It is understood that the representation of these *Gramineæ*— whose number will considerably increase with the study of the new collections—varies in the formation of the green-sward, according to the conditions to which we have already referred. And what a richness and abundance of flowers in this sward! In no part of this sketch have I so much felt the reduced space at my disposal as at present, when I am obliged to treat them in the most superficial manner, for these alpine-pastures have contributed more species to the Flora of the Sub-tropical Formation than all the other zones together.

According to the seasons, this Flora varies much. If we can believe the reports of the natives, the month of September—last of Winter or first of Spring—already presents its own flowers, which in general belong to the onions and bulbs, probably *Monocotyledones* of the *Liliaceæ*, *Amaryllideæ*, *Frideæ*, etc. The Summer flora is more constant, and represents a mixture in which the *Compositæ* predominate and show some magnificent forms, for instance, the *Cosmos peucedanifolius*, and species of *Bidens* with large flowers; the *Gentianeæ* and *Calceolariæ* predominate in the Autumn. Of the principal families which compose this Flora, I will cite first, the *Ranunculaceæ*; the *Berberideæ* contribute some characteristic arborets; the *Cruciferæ*, *Polygaleæ—Monnina* and *Polygala—Caryophylleæ*, *Amarantaceæ*—pretty *Gomfrenas—Malvaceæ*, *Chenopodieæ*, *Nyctagineæ*, *Geraniaceæ—Geranium Oxalis bipartita—Urticaeæ*, *Papilionaceæ* —in a great number of species, from the small clovers to the ligneous-forms—*Swartzieæ*,—*Cassias—Acacias—Acacia cavenia*; in the inferior zone—*Rosaceæ—Alchemilla Acaena—Melastomaceæ—Pleroma—Lythrarieæ Onagrarieæ*—beautiful *Epilobias* and *Oenoterias*—the *Loaseæ*, which, with their climbing-stems and showy-flowers, make a great appearance; the *Umbelliferæ* are much less important, because only one large species of *Eryngium* is notable. The *Passifloreæ* are also represented in certain places by a characteristic species—the *Tasconia umbilicata*;—the *Rubiaceæ* do not present many species, for example, some few ones of *Galium* whose roots are employed in dyeing, and the *Valerianeæ* offer some few species of *Phyllactis*. I have remarked

the predominance of the *Compositeæ*, whose forms vary from the smallest herb to the arboret—particularly species of *Baccharis* and *Proustia*. Unfortunately, I cannot give more space to them here. The *Campanulaceæ* are only represented by one notable species; the *Lobelieæ* by the pretty, delicate, and characteristic *Lobelia cymbalaria*, and the *Plantagineæ* by some few species not well studied as yet; also the *Asclepiadeæ*, which connect themselves to the columniferous *Cacteæ*, and to the bushes in various localities among the rocks; some of them spread a fetid odor as from a dead animal. I have already noticed the importance of the *Gentianeæ* in the Autumn Flora, and the number of new species corresponds to the number of the individuals. The *Personatæ* are also of importance, being represented by divers species ot *Calceolaria*, which may be considered as plants characteristic of this zone; some of them are hardly ever wanting in the alpine-pastures, as, for instance, the *Calceolaria teueroides*; others, constitute a real ornament of the Autumn Flora, especially in aqueous localities. The *Mimulus* and *Gerardia* show themselves frequently in their proper localities. A species of *Bartsia*, very similar to the European species *B. alpina*, characterizes the alpine Flora, whilst some pretty *Buddleyas* give us divers arborets in the lower parts of the Formation.

The great family of *Solaneæ*, which is so rich in species in all the zones of this country, is also found here in abundance, and it forms an essential part of the thickets of this zone, especially in the narrow-ravines which divide the slopes; sometimes they are arborescent plants, and some species produce pretty-flowers and edible-fruits—for example the genera *Salpichroa* and *Jochroma*. The *Acanthaceæ* are represented by a *Dicliptera:* the *Gesneriæ* by a *Ligeria;* the *Convolvulaceæ* by an *Ipomea* and a *Cuscuta;* and the *Hydrophylleæ* by some characteristic species of *Phacelia*. The *Borragineæ* are almost entirely wanting, but the *Labiatæ* are very numerous, particularly in individuals; I will only mention the MÁTICO—*Salvia Matico*—a medicinal plant much esteemed, then some species of *Xenopoma* in the form of arborets, which adorn this region to a considerable altitude. The scarlet Verbena is never wanting, nor yet the *V. juniperina*, the *V. erinoides*, or the *V. Bonariensis*, which we have already found in the Pampa, and in the Monte Formation. Some species of the genus *Lippia* adorn the alpine-pastures in their lower portion, and the *Cacteæ* present us with a large species of a very slab-sided Cactus-melon, of the size of a large pumpkin. According to Prof. Hieronymus, some species of *Ephedra* appear at a considerable altitude. The *Monocotyledones*, which we found in the season of my voyage, were not very numerous; for instance some pretty *Commelineæ*, some terrestrious *Orchideae* with beautiful flowers—col-

lected during our last voyage;—these species are not yet determined. Some *Sisyrhinchium* appear with a great quantity of individuals; divers characteristic *Cyperaeceæ* partly cover the marshes; whilst others are found in dry localities. The *Filices* and *Selaginellæ* are not wanting, but are of small importance and number in these pastures: among the rocks and ravines more species are seen. The *Musci* are very rare, but the *Lichenes*, on the contrary, are quite abundant on the rocks.

This sketch is sufficient: it only remains for me to mention two peculiarities. The thickets—such as *Xenopoma*, as I have already said—are found in the alpine-pastures up to a considerable altitude; they are specially met within the ravines, then being principally composed of *Solaneæ*, *Compositeæ* and *Berberideæ*. Sometimes bushes form the principal vegetation in the broad-vallies, as, for instance, near Tafí the *Cassia Hookeriana* and the *Eupatorium virgatum*, and in the valley of Granadillas or near the Cuesta de Juntas, where the *Baccharis sculpta* predominates. In the umbrageous ravines are found a delicate species of the *Piperaceæ*—and a humming-bird—which ascend to the hight of 13,000 feet.

A single word about what I call the pigmean alpine-vegetation. At those points where the slopes become leveled and the vallies widen, a soil similar to the clay of the Pampa is frequently seen even up to the altitude of some 7500 feet. A pigmean-vegetation exists in it whose principal element is an creeping *Alchemilla*—*A. pinnata* var. *minima*—vulgarly called ALGARROBILLA; it is considered as an excellent nourishment for cattle notwithstanding its smallness, even as the *Alchemilla alpina* of Europe is sought for the same purpose. Some other elements of the alpine-pastures are added to these, but all are pigmies; as for instance, the *Poa annua*, the *Geranium leucanthum*, the *Tagetes filifolia*, and others. Upon the summits but slightly undulated, a competition exists between this pigmean-vegetation and the true alpine-Flora, each undulation of the surface occasioning a variation in the humidity, in such wise that sometimes one, and sometimes the other, predominates. This is what I wished to observe in reference to the alpine-pastures of the Argentine Republic.

VIII. THE FORMATION OF THE PUNA.

Where the elevated plains and broad vallies of the Cordilleras rise above these pastures-grounds, surrounded as they are by mountains but little higher than they, and narrowing as they do, up to the vallies and deep ravines which break the mountain slopes; or where flat hollows — with or without lakes — are found, there, also, exist the essential conditions for the Formation

of the Puna. I have given this name to the vegetation of the high-Cordilleras of our territory, without making with Prof. Grisebach, a separation at the tropic of Capricorn, although I do not presume to deny that this separation could be made, and although, notwithstanding our superficial and imperfect knowledge, some zones more can already be distinguished.

No matter how artificial and indefinite it may be, I have already indicated the limit of this Formation with the alpine-pastures. Its limit with the Monte Formation I believe to be at the point where the thickets which characterize this last disappear, viz. the *Jarillas*, the *Mimoseæ*, the *Cæsalpina Gilliesii* and some others, and where the characteristic plants of the Puna begins to present themselves, a point indicated by the predominance of the *Compositæ*, *Solaneæ*, *Gymnocladus*, *Adesmiæ*, etc. First, I must note, that many plants which have the centre of their development in the vallies of the Puna, also penetrate a considerable distance into the Monte Formation, so that in certain localities it is doubtful to which Formation they ought to be attributed, as for example in the Campo del Arenal. Even more artificial is the limit with the alpine pastures, inasmuch as in the region of the Puna where the slopes are more precipitous, grazing grounds exist very similar to the alpine; I believe it is determined by the presence of the LLARETA or YARETA—*Azorella madreporica*—and the *Adesmia horrida*, which as a rule, indicate at the same time, a change in the vegetable relations, although this change may not always be very marked. These plants—as also, the other thorny species of *Adesmias*—likewise extend in isolated specimens to the alpine-pastures, or rather, the pastures extend into their territory, which sometimes causes the line of demarcation—as I have first said—to disappear. The superior part of the Sub-tropical Formation, where that of the Puna appears, is not always represented; for instance, near San Andrés, the last is found immediately above the zone of the Pine, and near Tarija, above that of the QUEÑOA. As a special distinctive of the Puna Formation I adopt the presence of some characteristic coppices, of which I cite the following: *Adesmia horrida*, *pugionata*, *inflexa;* species of *Baccharis*, as *B. polifolia* and *Calliprinos* and some undetermined, *Heterothamnus spartioides*, *Tessaria absinthoides*, *Chuquiraga spinosa*, *erinacea*, *Gochnathia glutinosa*, *Proustia pungens* var. *ilicifolia* — which shows itself in isolated individuals, as far as Córdoba—*Fabiana densa* and *denudata*, *Oxycladus aphyllus*, *Salvia Gilliesii*, *Acantholippia salsoloides*, and *Neosparton ephedrioides*. The herbaceous-vegetation presents much similarity to that of the alpine-pastures, particularly in the narrow-vallies and on the precipitous-slopes. Between the copses, a certain quantity of hard—as also, seldom, of some soft-grasses, is met with; whilst copses of *Gyneriæ*

clothe large extents of surface, and the rocky-slopes are covered with gigantic columniferous *Cacteæ*, or with a very large *Bromelia* whose flower stems are from 6 to 8 feet long, and 6 inches in diameter: or else—in those points where salt and sand predominate —we find some *Ciperaceæ* as a short and thick sward, and almost the only fresh verdure of this waste region. I add in continuation, the names of some characteristic plants: *Pycnophyllum sulcatum*, *Lupinus tomentosus*, *Astragalus unifultus*, *Hofmannseggia andina*, *Margaricapus alatus*, *Acæna canesceris*, *Œnothera nana*, *Loasa coronata*, *Azorella madreporica*, *Mulinum axilliflorum*, *Calycera Calcitrapa*, a species of *Senecio*, *Werneria cortusifolia*, *Doniophytum andciolum*, *Pachilæna atriplicifolia*, *Pratia oligophylla*, *Gentiana podocarpa*, *Argylia Uspallatensis*, *Phacelia pinnatifida*, *Arundo Sellowiana*—*Gynerium argenteum*—and some other *Gramineæ*. These plants have been gathered in the Cordilleras of Catamarca, and the list will increase when the collections found between Humahuaca and the valley of Tarija, have been studied.

The climate of the Puna is harsh and disagreeable, the soil sterile, and water scarce. The European will not establish himself where there are no metallic treasures or commerce. The industrious Indian—without doubt, for a long time—will be the only inhabitant of these wastes, and at all those points where a thread of water comes down from the mountains, he knows how to utilize it, and sometimes carry it across the rocks to force a small crop from the soil, and with which even he often comes to succor the indolent inhabitant of the most fertile sub-tropical-vallies. The principal cultivated plants are potatoes and the QUEÑOA.

We can dedicate but a few words to the last two Formations—that of the Gran-Chaco, and the Mesopotamian—because they are not sufficiently known as yet, and because the author of these pages, owing to his scientific isolation, is not in a condition to sum up the information received from some travelers.

IX. THE FORMATION OF THE GRAN-CHACO.

The portion of this Formation drained by the Upper Vermejo has been visited by Professors Lorentz and Hieronymus, but the rich collections gathered there have not yet been studied. I will, therefore, limit myself to some general remarks.

Situated as it is, at a greater distance from the Cordilleras, which attract the humidity, the climate is also drier, as may be seen by the vegetation. The magnificent forms of the sub-tropical forests are substituted by lower-trees, and the thickets increase in equal degree; frequently, plains covered with *Gramineæ*, al-

ternate with the woods and copses, constantly becoming more extended. Although the atmospheric humidity diminishes, that of the soil is great. The slightly-undulated, sandy, and great-plain of the Chaco, gently droops towards the rivers Paraguay and Paraná, and is crossed by some large, and very-serpentine rivers which sometimes unexpectedly increase. During and after the freshets the surrounding lands are inundated to a great extent, the highest points appearing like flat-islands. It is said, that the land subject to the inundations of the Vermejo, communicates with that which is covered by those of the Pilcomayo. When the waters subside a great quantity of lagunes appear, called here *Madrejones* which are supplied by rains and subterranean currents, and their borders are chosen for the establishment of military and agricultural posts, which defend the frontiers against the wild-Indians; or else they are used by the Indians themselves in their excursions.

Without these posts such excursions over the wilderness of the Chaco—where at some seasons they could be drowned—would be impossible in Winter for want of water; and equally so, were it not for the existence of a plant with an aqueous root, which by rasping and pressure produces a refreshing juice equally necessary to man and beast, as the Author himself has proved. It seems to belong to the *Thymelaeaceae* as we could judge by imperfect specimens.

The most elevated portions of the Chaco present to us a landscape like a park, where clumps of woods alternate with pastures of great promise, according to the opinion of the *estancieros*—cattle-breeders—not only for the raising of cattle which now prosper there, but also for agriculture, although they may not be so rich as those which are found near Oran. The lowest parts are generally covered with woods, and the pastures are relatively very reduced and composed in part, of but little esteemed *Graminea*; such as, reeds and spears of a hollow *Graminea*. The trees of the subtropical forest, more and more disappear, although some species yet extend a long distance on the river-shores, and—according to information from persons who know these districts—lose themselves down the river in parts where we have not been as yet. Some new forms replace them, but I can only cite a few caracteristic species, because I have already passed the limits assigned to me in this article. The *Bougainvillea* is one of the genera which is very characteristic: divers singular arborets belong to it, especially a high and very-branchy species with a brownish-red shedding-bark, vulgarly called DURAZNILLO, on account of the form of its leaves. At least, in the portion I have visited, no other more characteristic arboret is to be found. This vegetable extends in the vallies of the rivers to near Jujui, and it is represented by species of the same genus in the wide valley of Campo

Santo. Soon a certain quantity of *Capparideæ* is seen: they are notable among the bushes of the Chaco, and extend in part to the Saladillo river. A *Zygophyllea* under the name of the PALO-SANTO, is one of the characteristic trees; the people attribute great medicinal virtue to it. The PALO-BLANCO is a magnificent tree of the *Rubiaceæ* family: its timber is much appreciated, the same as the PALO-AMARILLO; the PALO-MATACO—*Achatocarpus nigricans*—some others have not been scientifically classified as yet. Forests of the cerifera Palm-tree—*Coperincia cerifera*—generally exist in the marshes and other damp localities; they produce an excellent palm-cabbage and a characteristic under-shrubberry surrounds them.

Two other plants still call our special attention; they are found, as it is said, in the Upper Vermejo, and in the forests of Santa-Fé, and their presence and prevalence even as far as the Saladillo river, authorize me in my Map to extend the Formation of the Chaco to this point. They are the VINAL and the QUILINO, *Mimoseæ* with monstrous-thorns and grotesque-forms which do not appear in the Monte Formation, but characterize a separate zone of the Chaco Formation. The first is the *Prosopis rucifolia*, which is highly esteemed in the countries in which it predominates; its fruit is a nourishment sought by cattle, and the leaves are a medicine for different maladies of the eyes; the timber is also used. The second, as yet has no scientific name, because I know neither its fruit nor its flowers. Judging from its other organs, it is a *Mimosea*, allied to the preceding.

I wish also to mention another characteristic plant of great utility to the Indians; it is called CHAGUAR, and belongs to the *Bromeliaceæ*. They make house-lines and cloths of different kinds with its fibres, especially shirts, which serve as cuirasses, being impenetrable to arrows, also fishing-nets, baskets, etc. They eat its bulbs and the fruit serves as a condiment more piquant than AJÍ.

It may be said that the elements of the Chaco diminish more towards the East. The soil is impoverished and the climate becomes drier, up to the point where the Vermejo enters into the River Paraguay; here the woods again present to us a certain quantity of species which we already know in the Sub-tropical Formation, particularly in the zone of the Park. Here the Paraguayan, or South-Brazilian zone, as we have heretofore called it, is met with. This zone is little known, in particular that portion belonging to the Argentine Republic, and called the Misiones. According to the sparse information I possess, a magnificent forest adorns these regions, its elements corresponding in part to those of the sub-tropical forest, over and above which it has the advantage of possessing the YERBA MATÉ, which in former

times furnished considerable wealth to the Jesuit fathers. But the Misiones offer us also a fertile soil, fit for all the articles of cultivation in warm countries.

I have no detailed information upon this region, and if in reality, there are some publications respecting it, they are not at my disposal. It is very opportune, not only in a scientific, but also in a practical, point of view, to make a voyage through these districts. A great future—judging from all that is said—awaits them, which will be immediately realized as soon as they are again populated.

X. The Mesopotamian Formation.

Although this Formation is much more accessible than the last, and although Bonpland lived there for many years, we are but little acquainted with its vegetation. Its fertility and wealth are well known, and would make of it the most important and powerful part of the Republic, were peace to reign in it. I refer particularly to the Province of Entre-Rios, which is very fit for agriculture and immigration. Whilst the Monte and Pampean Formations, probably for some time yet, will be the principal meat-furnishers of the Republic—although we have seen that the Pampa is not unfit for agriculture,—and the zone of the Park in the Sub-tropical Formation the garden, whilst the sub-tropical-forest is the producer of timber; the Mesopotamian Formation, with a part of Córdoba, Santa-Fé, and Buenos-Aires, will be its granary. Nevertheless, although we well know what are the products of agriculture in the Argentine Mesopotamia, its primitive vegetation is almost completely unknown. Only the environs of Concepcion del Uruguay have been explored; yet, for want of literary resources, the results of the exploration not having been studied, little can be communicated respecting them. It may be said in general, that this Formation differs from that of the Pampa, in the abundance of trees and bushes everywhere. In the pastures of this gently-undulating region, heaths and small coppices are also found everywhere, ornamenting the river shores, and covering the islands. Nor are forests wanting; the great forest of Montiel in the interior, is well known at least in name, and, moreover, some more or less extensive woods are found in different islands. The vegetation of the shores partly consists of woods, among which are palm-groves composed of a palm-tree called Yatay, combined, it is said, with some three other species. The sward—at least where I have had an opportunity of studying it—is very different from that of the Pampa; it is shorter and thicker, and assimilated to that of the sub-tropical-

forest, presenting in many places the same essential elements, such as the *Paspalum notatum*, and some other herbaceous characteristics of these pastures. This Formation is but slightly similar to the Monte, with the exception of some widely disseminated plants, common everywhere. The heaths, and—it is said—the forests also, are generally composed of elements which exist in the Sub-tropical Formation, and in great part also, of species which we have not met as yet, in other parts of the Argentine Republic; they are undoubtedly identical in part to those of the Paraguayan or Brazilian Flora, and in part characteristic species, new to science.

I must terminate this sketch here, and do so with the hope that the preceding pages may contribute to a more detailed knowledge of the vegetation of this beautiful Argentine country, as well as excite a desire to visit its happy shores. But the virgin-soil which can produce all the fruits of the temperate and torrid zones, yet more even, than the wealth of its actual productions, will without any doubt attract immigrants whose lives, devoid of mortification, will be alleviated and made happy by the magnificent climate. He who arrives here without exaggerated hopes, but with the good-will to labor seriously, may be sure of the result, at least in all that the vegetation promises; he will gain an independence, a home, and a smiling future for himself, and for his children a blessed inheritance.

October 28th, 1875.

Note upon the accompanying Maps.

On the phytogeographic map of a country certain extensive and important parts of which are only known superficially, the limits of each Formation and zone cannot be delineated with the same exactitude, as if they were based upon personal observations. Frequently these indications are only founded on superficial information, or on analogy, and often, therefore, the limits have been drawn by calculation or conjecture. Notwithstanding this, should the maps be of scientific value, the Author ought to acquaint his readers with the motives which guided him in tracing such limits as may be found in them, so that their relative exactitude could be estimated. Yet an explanation of this nature is not possible here, but rather belongs to the columns of a scientific periodical. I believe that the object will be gained if the reader of my sketch can form an idea at first sight by means of these maps, of the geographical distribution of the vegetables of this country: *i.e.* according to the actual state of our knowledge respecting them.

I have, moreover, to observe, that I had no intention of making topographical rectifications, but have only indicated the phytogeographical regions on maps taken without modifications from other works: and finally I observe, that I have only signalized the mountainous ranges by their name, where they are divided into phytogeographical regions. Where this, is not the case I have slightly indicated them by shade.

CHAPTER VIII.

THE ARGENTINE FAUNA.

ALTHOUGH the Argentine Fauna does not present that variety of form and color which invites the naturalist to turn his steps to tropical regions, nevertheless this Republic, in a zoological point of view, merits a several years' residence. To the East, the Ocean-coast and the wide-spread Pampas; to the West, the mountains with their varied Flora; the tropical-forests on the North; the exhuberant vegetation of the Provinces of Entre-Rios and Corrientes, which are properly called "the Argentine Mesopotamia;" and the abundantly stocked rivers: all these different features characterize a country as agreeable as fertile in surprises for the zoologist, who may even yet discover here considerable scientific treasures of high importance.

So far as regards Zoology, the study of the Argentine Republic has recently commenced, and only many years hence will it be possible to give a more or less complete review of the Argentine Fauna. Thanks to the perseverance of Professor Hermann Burmeister, who has been the Director of the Museum of Buenos-Aires since the year 1862, the first steps have been taken respecting the inferior animals. Before his time we had received only some vague zoological knowledge from travelers. It will be the principal task of the Argentine Zoological Society, not long since formed by the author of this sketch, to make an exact exploration of the country under this head.

On this account, what we write in continuation has no pretention whatever to be complete, and the less so, because the limited space which the Committee of the Philadelphia Exhibition

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* By Prof. Dr. H. Weyenbergh.

has placed at my disposal, obliges me to be as concise as possible. Properly speaking, therefore, we shall not treat here of the Fauna, but only give a general view of its extent in the country.

Almost all the domestic animals which are found in the Argentine Republic, were imported from the old world during the first century after the discovery of America, and their increase furnishes to the inhabitants their principal industry, that of raising cattle. There is an abundance of cows, horses, asses, mules—hybrids of the two former,—sheep, goats—common and Angora,—dogs, cats, swine, rabbits, hens, peacocks, turkeys, ducks, geese, pigeons, bees, silk-worms etc., belonging to divers races and varieties. Various species of singing birds—especially canaries—also exist here, as well as golden-fish (vulg. little colored-fish) marmots etc., whilst the list of animals involuntarily imported, whether as parasites of the domestic animals, or in merchandise, amounts to about forty in number.

For the rest I refer the reader to that part of this book which treats of grazing and husbandry, limiting myself here to a simple enumeration of the Argentine species of the different forms, the natural and original Fauna of this country.

VERTEBRATES.

I. MAMMALIA.

BIMANA.

The original human race of this country, called here "Indians," forms savage tribes spread over widely diverse territories. In general, its grade of civilization is inferior, and its number diminishes ever more and more; it is calculated to be at present about 100,000 (?). All these tribes belong to the American race *(Homo sapiens*, L., var. *Americana)*.

QUADRUMANA.

Monkeys are not found in the greater part of the country. Representatives of this order are only seen in the primitive forests of the Uruguay, and on the banks of the rivers Paraná and Paraguay, towards its North-Eastern confines. On the Bolivian frontiers other species exist.

They belong to the division of *Platyrrhinæ*, and members of the three families which compose it are found. The *Cebini*, or

howling-monkeys, are represented by the *Mycetes carayá*, Desm., and the *Cebus fatuellus*, L.; the *Pithecini* by the beautiful *Callithrix personata*, N. Wied, and the *Hapalini*, by the * *Hapale penicillata*, N. Wied.

Carnivora.

The Carnivora are represented in greater number. Of the family of the *Felina* we find the Jaguar, *Felis onça*, L., called tiger by the natives, and the *Felis concolor*, L., which is abundant in the Province of Córdoba, even in the suburbs of the city, and which the natives call lion; the *Felis Geoffroyi*, Guer., vulg. Gato Montés, also abounds in the Interior; the inhabitants frequently domesticate this latter on account of its handsome skin. According to some writers, the **Felis pajaros*, Azara, is also found in Patagonia and the Province of Buenos-Aires.

Of the family of the dogs, *Canina*, the following species are found: **Canis jubatus*, Desm., called the Argentine Wolf, on the shores of the large rivers, especially to the Eastward. A second species of the sub-family of the Foxes, is the *Canus Entrerianus*, Burm., which is principally found in the Province of Entre-Rios; an extremely graceful species is the *Canis gracilis*, Burm., which is not rare in the environs of Córdoba, and is called the Zorro—fox—although this name is also given to a commoner species the *Canis Azaræ*, Waterh. The *Canis Magellanicus*, Gray, is quite common.

The family of the Martens, *Mustelina*, is represented by some beautiful species, *i.e.*, the *Galictis vittata*, Bell.; the *Galictis barbara*, Wagn., the beautiful and well-known Argentine skunk, *Mephitis patagonicus*, the *Lutra paranensis*, Reng., which is not rare in the Paraná, and various others. The species of *Galictis* is called here by the name of Huron—ferret—and the Skunk is called Zorrino or Chincha.

I know two Argentine species of the family of the Bears, *Ursina*, genus *Nasua*; viz., the *Nasua socialis*, L.,—vulg. Soncho or Coatí—racoon—quite common throughout the country, and the *Nasua solitaris*, Reng., which inhabits the Eastern parts, and is quite rare.

Of the family of the Seals, *Phocina*, it is very rare that a species of the genus *Leptonyx* is found astray on the Argentine coast. This and other novel facts come from some sailors of Buenos-Aires.

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* I have not seen, during my residence in the country of more than two years, any of the species marked in the text by an asterisk.

Ruminantia.

The most numerously represented family among these is that of the Deer, *i.e.*, the *Cervus paludosus*, Desm., the Ciervo—or stag—of the natives; the *Cervus campestris*, Cuv., the Gama—or fallow-deer—, of the natives; this last is frequently seen during the voyage by rail from Rosario to Córdoba; as if frightened by the train, it often tries to keep ahead of it. It is much hunted. Another species is the *Cervus rufus*, Ill., etc.

The family of the *Tylopoda*—Llama—, belongs properly to the Western regions of South America, but is also represented in the North-Western portion of our country by two species, the *Auchenia lama*, Schreb., and *Auchenia vicuna*, Wagn.—vulg. Vicuña—, which live in small flocks; of each species a domesticated variety exists, var. *Huanaco* of the first, and var. *Paca* of the second species; the last is called in Bolivia, *Alpaca*. In this country, nevertheless, they are not used—like in Perú—as domestic animals, but the wool of the second serves for the manufacture of the finest ponchos, or Spanish-American riding-cloaks.

Pachydermata.

Only a pair of representatives of this order are found here, one of the family of Hogs, *Suina*, and the other of the Tapirs, *Tapiroidea*. The first species is the *Dycotyles torquatus*, Cuv., the Pecary or Javalí of the natives, which is found also in the Northern part of the high-land of Córdoba. The second is the **Tapir Americanus*, L., which only lives in the woods or on the shores of the great rivers of the North-East, and is quite common. The natives call it the Gran-Bestia—great-beast—or Anta.

Sirens *(Sirenia)*.

Occasionally, though very rarely, a single specimen of this order of marine phytophagous mammifers is found on the Atlantic coast, to the North of the River Negro; it is the **Manatus australis*, Wiegm., which has undoubtedly strayed away from its natural habitat.

Cetacea.

Professor Burmeister has published in the "Anales" of the Museum of Buenos-Aires, a monograph of this order. From it I quote the following species: *Balænoptera bonaerensis*, Burm.; **Physalus Patachonicus*, Gray; **Sibbaldius antarcticus*, Burm.; **Megaptera Burmeisterii*, Gray; **Phocæna Spinipinnis*, Burm.; **Orca Magellanica*, Burm.; **Pseudorca crassidens*, **Tiphius curvirostris*, **Pontoporia Blainvillii*, Burm.; **Epiodon australis*,

Burm.; *Delphinus microps*, Gray; **Delphinus obscurus*, Gray; **Delphinus cymodoce*, Gray; and a species of the genus *Physeter*.

Chiroptera *(Bats)*.

Proportionally speaking, the bats are poorly represented in this country; all the species we know belong to the family of *Gymnorhinae*. I quote first those mentioned by Dr. Burmeister, in his *Reise durch. die La Plata Staaten*; viz., **Dysopes multispinosus*, Burm.; *Dysopes naso*, Wagn.; *Plecotus velatus*, Geoff.; *Vespertilio Isidori*, Gerv.—this latter being very common throughout the country—; and the *Nycticejus bonaerensis*, Ley. Other species are found, viz.: **Dysopes ladicaudatus*, Geoff.; **Dysopes castaneus*, Geoff.; *Vespertilio nigricans*, N. Wied.; *Vespertilio ruber*, Gerv.; * *Vespertilio furinalis*, Gerv., and others.

Rodentia.

The gnawers form a considerable portion of the mammifers of the Fauna of South America, and we find many species in the Argentine Republic.

Of the Mice family, *Murina*, we find here the **Reithrodon typicus*, Waterh.; of the South American genus *Hesperomys*, the species *H. squamipes*, Brants., which lives in the islands of the Paraná; *H. longicaudatus*, Benn., in the Interior of the country; *H. arenicola*, Waterh., the commonest species; *H. bimaculatus*, Waterh., also in the Interior; and, moreover, various other species at present incompletely described.

Of the family of the *Muriformia*, the interesting Cuí—*Myopotamus coypus*, Cuv., is found on the shores of the Paraná. Sometimes the opportunity occurs of observing it whilst traveling in steamers on this river. The natives improperly call it Nutria. There is another species of this family, the *Ctenomys brasiliensis*, Blainv., scattered over the whole country, but very scarce. The natives call it the Tucutuco or Oculto.

Of the *Cavina*, we find the hare of the Pampa, *Dolychotis patagonica*, Wagn., which belongs particularly to the South-Eastern region. Of the genera *Cavia* and *Anœma*, I will only mention the *Cavia leucopyga*, Brandt—vulg. Conejo, or rabbit—, a species quite common in the gardens of all the cities of the Interior, as also the *Anœma coenoblephara*, Burm. There is no doubt that other species will yet be found in the Interior and North of the country.

The family of the *Eriomyna*, is represesented by the well-known Viscacha, the rabbit of the Pampa—species of prairie-dog—, *Lagostomus trichodactylus*, Benn., which abounds throughout the country, whilst another species the Viscacha of the high-land,

Lagidium Cuvieri, Wagn., is specially found in the mountainous regions. The *Hydrochœrus capybara*, Eral.—vulg. CARPINCHO—, which lives in families on the shores of the Paraná and its tributaries, is a notable animal of this family. It is frequently seen under the same circumstances which I have noted in mentioning the *Myopotamus coypus*, Cuv. It is said to be the principal aliment of the Jaguars.

EDENTATA.

Of this interesting Order, the family of the *Effodientia (Cingulata)*, armadillos, is represented. The natives call them TATÚS. Of the species which I have known as inhabiting this country, three belong to the genus *Dasypus*, laying aside, at least, the sub-genera into which this genus has been divided. These are the **Dasypus conurus*, Geoff.—vulg. MATACO—which lives in the S.E. district; the *Dasypus villosus*, Desm.—vulg. PELUDO—, spread over the whole country, and exquisite eating; and the *Dasypus minutus*, Desm.—vulg. QUIRQUINCHO. Of the genus *Praopus*, the *P. hybridus*, Desm.—MULITA or PICHE--is found in the Eastern Provinces, whilst the genus *Chlamydophorus* is particularly represented in the Province of Mendoza by the *Chlamydophorus truncatus*, Harl.—vulg. PICHY-CIEGO.

PEDIMANA *(Sarigues)*.

This order, which is only found in America, is represented in the Argentine Republic by the *Didelphis Azaræ*, Reng.—vulg. COMADREJA, or weasel. It abounds in all parts, and there is no doubt that other species ought to exist here.

II. BIRDS (Aves).

Of this class of the Animal Kingdom, a considerable variety of Argentine species exist. From the ostrich to the humming-bird, from the condor to the penguin; what difference in size! How many variations in general form! The number of species of birds is far greater than that of mammifers, as may be seen from the following enumeration, although it is as yet very imperfect.

RAPTORIAL BIRDS.

The family of the falcons, *Accipitrini*, is represented in this country, among others, by the following: **Phalcobœnus megatopterus*, Bon., spread over a great extent of the Interior, but not very common; *Milvago pezoporus*, Burm.—vulg. CHIMANGO—, found all over the country; as also the CARANCHO, *Polyborus*

vulgaris, Vieill., and the eagle, *Haliætus melanoleucus*, D'Orb. The sparrow-hawk, *Rostrhamus hamatus*, Ill., is particularly limited to the shores of the rivers; the *Buteo tricolor*, although quite rare, is found all over the country, and the natives give it the same name—GAVILÁN—as the preceding. Other species also carry the same vulgar denomination; viz., the *Asturia rutilans*, Licht., and the * *Asturia unicincta*, Temm. The *Falco sparverius*, L., is a very common bird, and the *Falco femoralis*, Temm., is found in the Province of Córdoba; the *Circus cinereus*, Vieill., is quite common in the Pampas, but the * *Hemiierax circumcinctus*, Kaup., appears to be much rarer.

The Argentine Republic holds a much less number of the family *Vulterini;* but the king of birds, the CONDOR, *Vultur gryphus*, L., which lives in the high mountains, belongs to it. Two other species are the * *Cathartes aura*, Ill., and the *Cathartes fœteus*, Ill.—vulg. GALLINAZO—, which is much more common. I have seen many specimens from the Province of Corrientes.

The family of the owls, *Strigini*, is more numerous. Nevertheless, I only know as yet a few species, such as the *Strix perlata*, Licht. — vulg. LECHUZA—, and the *Noctua cunicularia*, D'Orb., a common species which is generally found at the entrance of the viscacha-holes, and which is also called LECHUZA. We once received from the environs of Córdoba a little owl, the beautiful *Glaucidium passerinoides*, Temm., called here the king of the little birds. As yet we have never seen a second species of this genus, the *Glaucidium nanum*, Vig., which ought also to live in our Republic. We mention, finally, the two species * *Buho crassirostris*, Vieill., and *Otus brachyotus.*

SCANSORIAL BIRDS.

Of this Order, the family of the parrots, *Psittacini*, is the most common here, and presents various beautiful species to the study of the zoologist; viz., the *Conurus patagonicus*, Vieill.—vulg. LORO—and *Conurus fugax*, Burm.; the *Conurus murinus*, Gmel., which is seen in numerous flocks, morning and evening, flying and screaming over the city of Córdoba, whilst going from, and returning to the high-land, where they live in society in great nests. It is seen semi-domesticated in the houses under the name of CATITA (parrakeet). The *Conurus hilarus*, Burm., the * *Conurus Aymava*, D'Orb., and the *Conurus rubirostris*, Burm., are three other species of this numerous genus.

The very common and loquacious *Psittacus amazonicus*, Lath., and the * *Pionus menstruus*, L., also inhabit this country.

The bearded family of these birds, *Bucconidæ*, is quite common here under the name of DORMILÓN; it is the *Capitus maculatus*, Wagn.

The wood-peckers, *Picidæ*, which the natives call CARPINTEROS, are represented by the following species: *Drycopus atriventris*, D'Orb.; *Colaptes campestroides*, Mulh.; *Leuconerpes candidus*, Otto.; *Chrysoptilus melanochlorus*, L., **Deudrobates cactorum*, D'Orb., and probably some others.

INSESSORIAL BIRDS.

A great many species of this great Order so rich in form, are found in the Argentine Republic. We will only mention the most common, following the distribution of the families.

Family of the *Anabatidæ*: On account of its voluminous nest, the bird known by the name of CACHALOTE, *Anabates unirufus*, Lafr., belongs to this family. The **Anabates gutturalis*, Lafr., the *Phacellodomus ruber*, Vieill., the *Phacellodomus frontalis*, Lafr., the *Spernopyga aciticaudatus*, Bon., the **Coryphystera alaudina*, Burm., and the numerous species of the genus *Synallaxis*, *S. humicola*, D'Orb., *S. flavogularis*, Gould, *S. ruficapilla*, Vieill., *S. fuligniiseps*, Bon., *S. phryganophila*, Vieill., and various others, are abundantly dispersed in the Interior of the country. To this family also belong the HORNEROS of the natives—called thus because their nests are made of mud in the form of an oven (*horno*)—viz., *Furnarius rufus*, D'Orb., which is the most common. The other species are, **Lochmias nematura*, Bon., *Cillurus vulgaris*, Bon., *Ochetorhynchus validirostris*, Burm., **Ochetorhynchus ruficandus*, Bon., *Ochetorhynchus dumetorius*, Gould, *Ochetorhynchus lucinia*, Burm.—vulg. RUISEÑOR, or nightingale — *Geosita cunicularia*, Bon., **Geosita fissirostris*, Reich., *Geobamon rufipennis*, Burm., **Nasica gracilirostris*, Burm., etc.

The family of the *Eriodoridæ* is less numerous; the following species belong to it: **Pteroptochus albicollis*, Bon., *Rhinomya lanceolata*, Bon. — vulg. GALLITO —, *Thamnophilus ruficapillus*, Vieill., *Thamnophilus Stagurus*, Licht., *Thamnophilus cœrulescens*, Vieill., etc.

The beautiful family of the *Trochilidæ*—vulg. PICA-FLORES, or humming-birds—is represented by various species. The commonest is the golden-green of our gardens, the *Trochilus flavifrons*, Licht.; also the **Petasophora crispa*, Spix., *Heliomaster angelæ*, Less., **Thaumatias albicollis*, Licht., *Cometes sparganurus*, Shaw, etc., are found.

Of the family of the *Vereonidæ*, belonging to South America, are found the **Cyclosis viridis*, Vieill.; of the *Liotrichidæ*, the *Troglodytes platensis*, Burm.—vulg. TACUARA—, *Mimus theuca*, Bon., *Mimus calandria*, Bon., *Mimus trincus*, Bon., **Donacobius atricapillus*, Bon., **Cirtothorus fasciolatus*, Burm., etc. The

specific names of the two first species of *Mimus* is taken from the names given by the natives.

The family of the *Motacillidæ* is represented by the *Sylvicola venusta*, Temm., and the species *Anthus rufus*, Bon.; that of the *Muscicapidæ* or fly-catchers, by the *Culicivora humicola*, Bon., and *Setophaga brunnipes*, Lafr.; and the *Turdus rufiventris*, Licht.—vulg. ZORZAL — the **Turdus crotopezus*, Ill., and the *Turdus fuscator*, D'Orb., represent the *Turdidæ*, or black-birds.

As well may be imagined, we meet with many representatives of the family of the *Colopteridæ*, comprehending under this general name some families exclusively South American. We will cite the most common. *Phytotoma rutila*, Vieill., *Saurophagus sulphuratus*, Bon., *Tyrannus melancholicus*, Vieill., *Tyrannus violentus*, Vieill., **Tyrannus auriflamma*, Burm. (These three last are called by the natives, BIEN-TE-VEO—well I see you—an onomatopœia of the cry of the bird); **Mionectes rufiventris*, Bon., *Elœnea modesta*, Bon:—vulg. ALFRECHERO—**Serpophaga nigricans*, Gould, *Serpophaga subcristata*, Vieill., **Phylloscartes flavocinereus*, Burm., **Anæretes parulus*, D'Orb., **Hapalocecus flaviventris*, Cab., *Platyrhynchus parvirostris*, Gould—vulg. FUEGUERO — *Tricecus margaritiventris*, Lafr., *Alectrurus psalurus*, Temm., **Cnipolegus cyanirostris*, Boje, *Lichenops perspicillatus*, Bon., *Centrites rufa*, Gm., *Machetornis rixosa*, Gray, *Agriornis striatus*, Gould, **Agriornis leucurus*, Gould, *Tæniioptera nengeta*, Bon., *Tæniioptera coronata*, Vieill., *Tæniioptera dominicana*, Vieill., *Tæniioptera moesta*, Licht.—vulg. VIUDITA—**Tæniioptera rubetra*, Burm., *Ptyonura rufivertex*, Lafr., **Ptyonura capistrata*, Burm., *Ptyonura maculirostris*, Bon., *Ptyonura brunnea*, Gould, etc., etc.

The representatives of the *Icteridæ* are the following: *Xanthornus pyrrhopterus*, Vieill., *Cassicus solitarius*, Vieill., *Psarocolius unicolor*, Licht., *Molobrus sericeus*, Licht.,—vulg. TORDO —**Molobrus badius*, Cab. The two last species have the same habit as the European cuckoo, to wit, that of laying their eggs in the nests of other birds.

The ravens and crows—CORVINA—are represented by the exclusively South American genus *Cyanocorax*, in the person of its sole indigenous species *Cyanocorax pileatus*, Temm., which is not rare.

Including some sub-families, I cite as the representatives of the family of the *Fringilidæ*, the species **Pyranga occinea*, Gray., *Tanagra sayaca*, N. Wied., *Tanagra striata*, Gm., **Stephanophorus cæruleus*, Str., *Saltator cærulescens*, D'Orb., *Saltator aurantirostris*, Bon., **Saltatricola multicolor*, Burm., *Calyptrophorus cuculata*, Bon.—vulg. CARDINAL—*Tachyphonus capitatus*, D'Orb., *Gubernatrix cristatella*, Bon., **Lophospiza*

pusilla, Burm., *Diuca vera*, Burm., *Diuca minor*, Bon., *Poospiza melanoleuca*, Bon., *Poospiza torquata*, Bon., *Poospiza nigrorufa*, Bon., **Poospiza albifrons*, Vieill., *Emberizoides macrurus*, Lath., *Embernagra platensis*, Bon., **Embernagra olivascens*, Bon., **Coturniculus manimbe*, Bon., *Zonotricha hypochondria*, D'Orb., *Zonotricha matutina*, Bon.,—vulg. CHINGOLO—*Zonotricha strigiceps*, Gould, — vulg. CACHILA — **Phrygilus Gayi*, Cab., *Phrygilus caniceps*, Burm., *Phrygilus rusticus*, Cab., *Phrygilus carbonarius*, Bon., **Phrygilus fruticeti*, Bon., which inhabits the high mountains, *Catamenia analis*, Bon., **Sporophila ornata*, Bon., **Ortzoborus Maximiliani*, Cab., **Coccoborus glaucocæruleus*, Cab., *Sycalis luteiventris*, Bon., **Syculis chloropis*, Burm., *Chrysomitris magellanica*, Bon., *Chrysomitris marginalis*, Bon., **Chrysometris atrata*, Bon., *Trupialis guianensis*, Bon.,—vulg. PECHO-COLORADO—*Trupialis militaris*, L., *Trupialis loyca*, L., *Amblyrhamphus ruber*, Bon., *Leistes anticus*, Bon.,—vulg. PECHO-AMARILLO — *Chrysomus frontalis*, Bon., *Agelaius Thilius*, Bon., and various others.

The Argentine Republic also contains some species of the interesting family of the *Halcyonidæ*, called by the natives PESCADORES; for instance, the *Megaceryle torquata*, L., *Chloroceryle Amazona*, Lath., and the *Chloroceryle Americana*, L.

As forming a part of the *Gypselidæ* family Mr. Burmeister mentions the *Acanthylis collaris*, Temm.; and the *Podager nacunda*, Veill., *Hydropsalis psalurus*, Temm., *Anthrostomus longirostris*, Bon., and the *Anthrostomus parvulus*, Gould, species of the *Caprimulgidæ* family, are also found here.

The interesting family of the Swallows, *Hirundinidæ*, is represented by seven species: the black-ordinary swallow *Progne domestica*, Gray,—vulg. GOLONDRINA—*Cotyletapera*, Bon., **Cotyle pyrrhonota*, Vieill., **Cotyle fuscata*, Bon., *Cotyle leucoptera;* Gm., **Cotyle leucorrhoea*, Viell., and *Alticora cyanoleuca*, Vieill.

In this review of the small-birds, we have been compelled to make only an arid and incomplete enumeration, from want of space. In no other manner, however, could we have sketched the opulence of our Fauna, whose description has been confided to us, in such a few lines.

GALLINÆ.

The sub-orders of pheasants and pigeons which form this order, are not represented here by a large number of species. These, however are very interesting.

Of the family of the pigeons, *Columbinæ*, we have the *Patagiænas maculosa*, Temm.—vulg. TORCAZA—the pretty *Columbula picui*, Temm.—vulg. PALOMITA—the *Metriopelia menaloptera*, Bon.—vulg. TÓRTOLA—the *Zenaida maculata*, Bon., which we

have kept in domesticity in company with our ordinary pigeons without any copulation with them—and the *Peristera frontalis*, Temm.; all these species are also found in the province of Córdoba.

Of the poultry families that of the *Tetraonidæ*, which the natives call PERDICES—partridges—is represented by the following species: *Eudromia (Crypturus) elegans*, Lufr., *Rhynchotus rufescens*, Wagl., *Nothura cinerascens*, Burm., and *Nothura maculosa*, Temm., all of which are notable for their beautiful eggs. They are very much hunted on account of their savory flesh. We have received eggs belonging all to these species, from the province of Córdoba.

The great species which are classified in the family of the *Penelopinæ*, also abound in our country, as for instance, the * *Penelope canicollis*, Wagl.,—vulg. CHARATA—which is found at the foot of the mountains; the *Penelope pipele*, Temm., which lives in preference in the woods; and the *Craxalector*, L., which is found to the Northward, and of which until now we have only seen a cranium.

RUNNERS *(Cursores)*.

The only species of this order is the *Nandú* or *Churí*, also called AVESTRUZ—ostrich—belonging to the family of the *Struthionidæ*. It is the *Rhea americana*, L., which is not rare in any part; when caught young it is easily domesticated; its eggs and chicks are eaten, and the feathers used. Successful efforts have been made recently to cross this species with the African ostrich, for the purpose of obtaining finer feathers.

WADERS *(Grallatores)*.

This Order has been less studied than any other in our country, and we are convinced that a sufficient time spent near the swamps and lakes, would give a satisfactory result.

The best known species of the family of the *Alectoridæ*, are the *Palamedea Chavaria*, Temm.—vulg. CHAJÁ or YAJÁ—a large bird which is not rare on the borders of the river Primero, and the *Dicholophus Burmeisteri*, Hartl.—vulg. CHUÑA — a species that we have seen domesticated.

Of the family of the herons, *Ardeidæ*, are found in the Argentine Republic, the *Ardea Gardeni*, Gm., the *Ardea cocoi*, L.—vulg. GARZA—the *Ardea cœrulea*, L., in the Province of Buenos-Aires, the *Ardea leuce*, Ill., the *Ardea nivea*, Licht., the *Ciconia Maguari*, Temm., and the *Tantalus loculator*, L. The two last species are well known by the natives, the first by the name of TUYUYÚ, the second as CIGÜEÑA; we add also the *Platalea ajaja*, L. —vulg. ESPÁTULA. Of the fine class of *Ibis*, we find here the *Ibis*

plumbea, Temm. * *Ibis albicollis*, Vieill., *Ibis infuscata*, Licht., *Ibis chalcoptera*, Temm., and others.

Of the family of the *Scolopacidæ*, I know the *Tringa dorsalis*, Licht., the *Scolopax frenata*, Ill., the *Rhinchia Hilarii*, Val., the *Himantopus nigricollis*, Vieill., the *Totanus melanoleucus*, Licht, and the *Totanus flavipes*, Licht.

The family of the *Charadriadæ*, is represented by the species *Charadrius virginianus*, L., *Charadrius Azaræ*, Licht., *Vanellus Cayanensis*, L.—vulg. TEROTERO— *Vanellus modestus*, * *Thinocorus Orbignianus*, Less., and others; and as representing the *Rallidæ*, we mention the species of *Aramus scolopaceus*, Vieill., *Aramides gigas*, Spix., *Aramides nigricans*, Vieill., *Aramides rhytirhynchus*, Vieill., * *Ortygometra melanops*, Vieill., * *Corethura leucopyrrha*, Vieill., *Gallinula galeata*, N-Wied., *Fullica armillata*, Vieill., *Fulica leucoptera*, Vieill., and *Parra jacana*, L.

SWIMMERS *(Natatores)*.

The family of the *Laridæ* is certainly represented by various species unknown to us until now, because the Southern coasts have not yet been sufficiently explored. We will only mention the following species: *Larus vociferus*, Gray—vulg. GAVIOTA— *Larus maculipennis*, Licht., *Larus serranus*, Tsch., *Sterna magnirostris*, Licht., *Sterna argentea*, N-Wied, and *Rhinchops nigra*, L.

The family of the *Steganopodes* is represented by the *Heliæus brasilianus*, Licht., whilst of the divers, *Colymbidæ*, are found the *Podiceps bicornis*, Licht., and the *Podiceps dominicus*, L.

The most numerous family of this Order is without doubt that of the ducks, *Anatidæ*, of which we will mention the following species: *Phœnicopterus ignipalliatus*, Geoff.—vulg. FLAMENCO— *Cygnus nigricollis*, Lath., *Cygnus coscoroba*, Lath.—vulg. GANZO —goose—*Sarcidiornis regia*, Lath., vulg. PATO—duck— * *Chlorephaga melanoptera*, Gray—vulg. PINGUE—* *Bernicla antarctica*, L., *Carina moscata*, L., *Dendrocygna fulva*, L., * *Dendrocygna viduata*, L., *Dafila bahamensis*, L., *Dafila spinicauda*, Vieill., * *Querquedula flavirostris*, Vieill., *Querquedula maculirostris*, Licht , *Pterocyanea cyanoptera*, Vieill., *Pterocyanea platalea*, Vieill., Mareca *chiloensis*, Gray., *Anas brasiliensis*, Gm., *Anas peposaca*, Vieill., etc.

PENGUINS *(Impennes)*.

The only indigenous species, that is to say, the only species which has been observed as yet on the Patagonian coast, is the *Apptenodytes patagonicus*, L.; but inasmuch as various species of this Order live on the shores of Tierra-del-Fuego and the Falk-

land Islands, there is no doubt that other species will be found from time to time in Patagonia.

III. AMPHIBIA.

The class of the Amphibia is sufficiently numerous in our Republic, but as yet we do not know the species with precision, because no one, heretofore, has been especially occupied in their study. Those which are met with as a general rule have not even been described, or at least are known incompletely. In the following enumeration, therefore, we shall only mention the most common.

Tortoises and Turtles (*Chelonii*).

As a part of the family of the *Testudinæ* or tortoises, the *Testudo sulcata*, Gm., is sufficiently disseminated in the Pampas. It is the same species which is found in Africa in the same degree of latitude.

Of the family of the *Emydæ*, fresh-water turtles, a species called *Platemis Hilarii*, Dum., is found in the great rivers, whilst of the *Cheloniæ*, or family of the sea-turtles, a couple of species the *Chelonia Mydas*, L., and the *Chelonia imbricata*, L., are found not far from the Argentine coast and are sold by sailors in Buenos-Aires for the kitchen.

Sauria.

This is an Order very rich in forms, but as yet superficially studied so far as regard the Argentine species, of which the first family, the *Loricati* or crocodiles, is represented by a single species which we have seen only once in a single specimen in the river Paraná, the *Alligator sclerops*, L., whilst the *Ameivina* exhibit the great *Podinema Teguixin*, Wagl.—vulg. Iguaná.—As a robber of domestic birds and eggs it is feared and persecuted every where. We have had a specimen of this species in our garden, which is surrounded by a wall, for almost one year, without being able to ascertain what it lives on, because it did not eat anything we gave it; finally it disappeared. The *Acrantus viridis*, Wagl.—vulg. Teyu—and various others are not rare.

The *Humivagæ* are represented by the species **Leiosaurus scapulatus*, Burm., *Leiosaurus multipunctatus*, Burm., *Leiosaurus marmoratus*, Burm., **Leiosaurus fasciatus*, D'Orb., *Diplolæus Biubronii*, Bell., **Diplolæmus Darwini*, Bell. (the last three are found in Patagonia), *Centrura flagellifer*, Bell., *Proctotretus Wiegmanni*, Dum., which is one of the commonest species, etc.

The *Gymnodactilus horridus*, Burm., of the family of the *Ascalobotæ*, is found in the high lands of Córdoba.

We know various species of the family of the *Scincoidei* which as yet we have not been able to determine with precision. We will only cite the two common species, *Ophiodus striatus*, Spix., and *Eumeces bistriatus*, Spix.

The family of the *Glyptodermi* is quite numerous, but the greater part of the species has not been described. We have found, however, the species *Amphisbæna Kingii*, Bell., and *Cephalopeltus scuticeps*, Weyenb., which we have described elsewhere, as well as various others.

Ophidia.

Although the serpents are very numerous in this country we are obliged, for want of a sufficient description, to pass by a considerable part of the species collected.

Of the *Typhlopina*, we have received from San Juan, the *Typhlops reticulatus*, L.; the *Stenostoma albifrons*, Wagl.,, is common everywhere, and we know also a species equally small of the same genus which we have called *Stenostoma flavifrons*, Weyenb. This species is distinguished by the complete want of a white extremity to the tail, and by not being white, but orange-yellow in the triangle of the forehead.

Of the family of the *Colubrina*, we have had the species *Coronella pulchella*, Bibr., *Liophis reginæ*, L., *Liophis Merremii*, Schl., *Helioceps Leprieurii*, Dum., *Xenodon severus*, Schl., *Brachyruton plumbeum*, Dum., *Dryophilax olfersii*, Schl., (common) *Dipsas Nattereri*, Schl., *Anholodon Mikani*, Schl.

It is generally known that the *Boa-constrictor*, L., also inhabits this country, but it is not found in the interior. On our arrival at Córdoba—October 1872—the edifice for the Exposition which had been celebrated the previous year, was being demolished, and the workmen had found beneath it quite a large specimen of this serpent, which without doubt when very young, had been transported there by accident either in some of the products exposed, or in the timber used for the building. We had time to see on the spot, its putrified and completely destroyed remains.

We also possess some species of the *Elapidæ* and *Crotalina* families. Of the last we will only cite the *Trigonocephalus alternatus*, Dum.,—vulg. Vivora de la Cruz—and the *Crotalus horridus*, L.,—vulg. Cascabel, rattle-snake—of which we possess a gigantic specimen from the high lands of Córdoba. The serpents constitute the greatest part of the remittances that from time to time, and even now, are sent to us; which may be surely attributed to the easy method of collecting them, and preserving them in alcohol.

Later on, we will give a more detailed description of those species which we have not mentioned here.

Batrachia.

As a representative of the family of the *Ranæformes*, the copious species known by the name of Escuerzo, *Ceratophrys ornata*, Bell., is found in the Province of Buenos-Aires: the natives consider it to be poisonous, although such is not the fact. To this we add the species *Cystignathus caliginosus*, Gir., *Cystignatus mystacinas*, Burm., *Leiuperus marmoratus*, D'Orb., *Leiuperus nebulosus*, Burm., and others.

Of the family of the *Hylæformes*, we have known as inhabitants of this country the *Hyla pulchella*, Dum., and the *Hyla leucotænia*, Burm., etc. Of the family of the Toads, *Bufoniformes*, we know the *Bufo luteus*, Gm., the *Bufo D'Orbignii*, Dum., and among others a very pretty species to which, in case it has not yet been described, we will give the name of *Phryscus Stelzneri*, Weyenb. We will describe it here in a few words with the intention of doing so elsewhere, with more detail. It is found in the high lands of Córdoba: is of a graceful form, no longer than 2.75 centim. It is black, with spots of brick-red color as follows: a series of converging stains between the eyes and the upper lips in a horizontal direction; one in the angle of the mouth; a larger one and two little ones, on the breast at the base of the humerus extending somewhat towards the belly; a much larger one on the side of the belly, and a large one on the inferior surface of the superior half of the thigh: between these last—which connect in the middle of the body—and the stains of the belly, some dots are regularly distributed on the black ground.

On the dorsal surface a stain is seen at the shoulders, and a smaller one on the space between these and the eyes; a long stain frequently divided into two, and more or less of the form of a line, is found on the inferior portion of the side. Nevertheless, these stains are not placed in a completely symetrical manner, nor are they altogether constant. In the axillary a little stain is found, and another upon the humerus, whilst on the internal surface of the arm, a series of small points is seen. The soles of the feet are likewise red, excepting the exterior finger of the posterior feet. Specimens are also found, chiefly females, which have more red stains; viz., upon the edge of the upper lip, in the middle of the occiput, on the back, etc.

Salamanders *(Saurobatrachia)*.

We recollect having seen a Salamander, perhaps of the genus *Bolioglossa* or *Desmodactylus*, in a collection which came from

Corrientes. Otherwise we are unable positively to state the presence of this order in the Argentine Republic.

CECILIA *(Ophiomorpha)*.

We know two species of this order in this country; one is probably the *Cæcilia rostrata*, L., and the other appears to us to be new.

IV. FISH (Pisces).

The Argentine fish are less known even than the reptiles, and with this difference, that the reptiles are collected in great quantities and preserved in the Museum, but without being determined or described, whilst the Fish in general are not collected, and consequently are not found in any of the Museums. For this reason the knowledge we have of the ichthyological Fauna of these countries is as yet very superficial; as much in respect to the Fauna of the rivers, as to that of the sea-coast. Although no enumeration exists based upon collections, we may be sure that, proportionally speaking, on the sea-coast few unknown or new species are to be found, whilst, on the contrary, the unknown species in fresh-water are much more numerous.

Of each family we will only cite those species, or genera, which sooner or later must be found on the coast of the Atlantic Ocean, and those which are sold in the markets of the seaports, mentioning also the species which we know as inhabitants of the fresh-water of our rivers, lakes and lagunes, in the Interior.

Owing to the fact that we have continually resided in the Interior far from the coast, we must place an asterisk before the greater part of the marine species and genera.

FISH (properly called *Teleostei*).

The *Percoidei* are undoubtedly represented on our coasts by the genera *Mullus*; *Sphyraena*, *Bovichthys*, *Pinguipes*, *Holocentrum*, *Bodianus*, *Sciaena*, *Mesoprion*, *Amphitrionus*, *Rypticus*, and others. We have received from the rivers of the Interior the *Percichthys lævis*, Jenn.; Burmeister also mentions the **Basilichthys cuyanus*, Burm., of Mendoza; we know, moreover, a pair of intermixed species, probably new to science.

The genera *Pagonias*, *Hæmulon*, *Pristipoma*, *Eques*, *Sciæna*, *Lepipterus*, and others, of the family of the *Sciænoidei*, are probably found on our coasts. One of its species may be met with from time to time in the markets of Buenos-Aires. The representatives of the *Sparoidei* without any doubt are less abundant; for our part, we do not know any Argentine species

of this family, but it is not impossible that on our coasts some species of the genera *Acharnes*, *Sparus*, and *Dentex* may be found.

Probably the *Mugilloidei* are not represented here, and the same may be said of the *Cataphracti* and *Labyrinthici* families. Of the *Scomberoidei*, the *Seriola cosmopolita*, Cuv., is found here, and perhaps also the species **Naucratus ductor*, L., *Trichiurus lepturus*, L., *Coryphæna hippurus*, Bloch., *Cheilodipterus heptacanthus*, Cuv., *Chætodon glaucus*, Cuv., *Scomber sarda*, Bloch., *Scomber pelamys*, L., and various species of other genera, viz., the *Xiphias*, *Zeus*, *Thyriites*, etc.

The genus *Acanthurus*, of the *Theutyoidei*, as well as some species of the family of the *Labroidei*, ought likewise to be found here.

Although there may be many species of the *Chromidoidei* and *Etheostomatidei* in the South American rivers, particularly in those of Brazil, we have not been able to meet with any indigenous species of these families.

There is no doubt that every now and then a species of the genus *Echeneis*, family of the *Gobioidei*, must be transported to our shores by the vessels to which they cling; but speaking with propriety, there is no indigenous species of this family. Nor can we say, whether any other genera of *Gobioidei* and *Blenoidei* live in the Atlantic Ocean in our latitude. The same may be said of the genera *Laphius* and *Fistularia*.

The *Pleuronectoidei* are undoubtedly found on our coasts; we know at least one species which has much resemblance to the *Solea variolosa*, Kner., and one of the genera *Achirus* and *Pseudorhombus*. Dr. Lorentz, Professor of Botany, has spoken to us about a *Pleuronectoide* which he found in the lakes and rivers of the Interior; consequently it would belong to fresh water. However, we have not seen it. ANCHOA and PALOMETA are indigenous names of species of *Solea*.

Species of the genus *Phycis*, of the family of the *Gadoidei*, have been found, and we doubt not more will occur. Of the eel-family, or *Anguilloidei*, a species of *Conger* is particularly met with in the market of Buenos-Aires. Some species of the pike-family, *Esocoidei*, of the genus *Galaxias*, are found in the Patagonian rivers, and it is very probable that the genus *Exocœtus* or other ally, exists on our coasts.

The numerous family of the herrings, *Clupeoidei*, has various representatives here; viz., the genera *Butyrinus*, *Elops*, *Engraulis*, *Pellone*, etc.

Some species of the family of the *Salmonoidei*—sub-family of the *Characini*—live in our rivers; we will cite as examples, the species *Macrodon trahira*, Müll.,—vulg. TARARIRA—*Pacu ni-*

gricans, Müll.,—vulg. Boga—*Schizodon fasciatus*, Spix, **Tetragonopterus maculatus*, L., *Salminus brevidens*, Müll.,—vulg. Dorado, or Salmon—*Serrasalmo marginatus*, Val.,—vulg. Curbina—* *Piabuca argentina*, Cuv., *Osmerus spec.*—vulg. Pejerey, etc.

Our small rivers and aqueducts contain various beautiful species of the interesting family of the *Cyprinodontoidei*, the viviparous *Poecilius* being particularly engaging: the greater part is, however, yet to be described. We will only mention the species *Xiphophorus Heckelii*, Weyenb., which we have delineated elsewhere.

The Argentine Republic possesses in its rivers and other fresh waters, some curious species of the *Siluroidei* family. Those which belong to the sub-family of the *Loricariæ*, for instance, the *Loricaria maculata*, Block, and the *Hypostomus plecostomus*, Val.,—vulg. Vieja del Agua—hold the first place. The *Callichthyini* are met with, and we know at least ten species of the genus *Bagrus*, in the waters of the Interior, almost all of them being new to science. Moreover, we have seen some small species of the *Trychomycterus Macrœi*, Gir., which ought to be placed either in this or an allied genus.

Probably the *Gastrophysini* are found on our coasts; but we doubt whether any representatives of the family of the *Sygnathoidei* exist there.

It would only be possible at present to study the sea-fish on our coasts, were we able to visit all the Museums of both Continents, for the purpose of collecting the necessary data. In our country no Museums contain them.

Selachii.

So far as we know, the presence of Sharks on the Argentine coast is not as yet proved, unless it be by the **Carcharodon Rondelettii*, to which the data we have received appear to refer.

Of the Rays, *Rajidæ*, the genera *Rhinobatus*, *Rhinoptera* (?) *Cephaloptera* (?) etc. are undoubtedly found.

Representatives of the other orders of fish, have not as yet been observed within the limits of the Argentine Fauna.

INVERTEBRATA.

However superficial and incomplete the preceding enumeration of the vertebrates may be, we should far exceed the limits assigned to us, were we to treat in a different manner the immense army of invertebrates which peoples the region of La Plata.

Especially would this be the case respecting the insects, because it is a generally admitted fact that, taking the number of the known species at 100,000, the class alone of the *Arthrozoa* would include $^4/_5$, or 80,000 of the whole. Let us say, then, that the superficial extent of the Argentine Republic being equal to $^1/_{25}$ part of the continental surface of the terrestrial globe—we leave out the seas where insects rarely live — it would thus arise, supposing other places were the same—which in reality is not true, because Northern countries have a much poorer Fauna—that the number of Argentine insects would be $^1/_{23}$ of this general figure, or say 3,200.

Here we only speak of the known species; if we add also the unknown—or until now undescribed species—there is no doubt the number would rise to 8,000.

From this it may easily be understood, that we will not even attempt to enumerate the known species in this place. We will only mention some genera, or at most a certain number of species, which is more particularly in harmony with the superficial knowledge we yet possess of the Argentine Fauna of Invertebrates.

V. MOLLUSCA (Malacozoa).

Before speaking of the insects, we ought to dedicate a few lines to the Mollusks, of which we know something more, thanks to the investigations of Professors Strobel and Döring, although their studies were limited to land and fresh-water Mollusca. We know very little as yet of our marine Mollusks.

Cephalapoda.

We are not acquainted with the Argentine coasts. A few days before our arrival in the mouth of the Plata, the sailors of the steamer presented to us two specimens of a species of *Loligo*, which we could not then determine with exactitude. Sometimes the *Ommastrephis giganteus* has been found on the Patagonian coast, and we have seen a dorsal-shell which appeared to us to belong to a species of *Cheirotheutis*, which was found on the shore at Bahia-Blanca. Sailors who voyage around Cape Horn say that from time to time they see a species of the genus *Argonauta*.

Gastropoda.

We have seen the shells of a pair of species belonging to the *Patellidæ* family, which were found near Cape Corrientes. We doubt not that some species of the *Haliotidæ*, *Neritidæ*, *Muri-*

cidæ and *Olividæ* families are also found, as well as one or two species of *Buccinidæ*, *Janthinidæ*, *Onustidæ*, *Naticidæ*, *Littorinidæ*, and others, although it is only by chance that one or another specimen reaches our coasts.

The fresh-water families *Paludinidæ* and *Ampullaridæ* are represented by four genera, of which Mr. Döring mentions fifteen species. These genera are the *Cerotodes*, *Ampullaria*, *Ampulloidea*, and *Paludestrina*. There is no doubt that the sub-order of the *Pneunomopona* is represented here, but as yet exact information on this point is wanting.

The family of the *Limnaeidæ* appears in the *Chilina Planorbis*, and *Ancylus* genera, of which ten species more or less, have been described for the first time by D'Orbigny.

The great family of the *Helicidæ* is quite abundant in this country; at least 25 species exist belonging to the genera *Omalonyx*, *Succinea*, *Helix*, and *Bulimus*. The greater part of these species has been already described by D'Orbigny, whilst Dr. Döring has latterly added the species *Omalonyx patera*, *Succinea rosarensis*, *Succinea porrecta*, etc.

Far less numerous are the *Limacidæ* species; almost all the indigenous specimens belong to the sub-family *Vaginilina;* viz., *Viginulus solea*, D'Orb., *Vaginulus Paranensis*, Burm., *Vaginulus Bonaerensis*, Strob., *Agriolimax Meridionalis*, Doer., *Limax variegatus*, Drap., etc.

Probably species of the *Critonidæ*, *Pleurobranchidæ*, and *Acera* families will also be found on our coasts, as well as the *Doridídæ*, *Aeolidídæ*, *Carinariacea*, and *Clionidæ*—of which we know a species—etc. We again repeat here our remarks about the unexplored state of our coasts.

Lamellibranchiata.

Under this head, and for the same reason, we must speak exclusively of fresh-water species. Nevertheless, we know two or three species of *Ostracea*—oysters—of our coasts, as also some *Pectineæ*; it is probable that the *Arcacea* will be met with.

The fresh-water family of the *Najadea* according to Professor Döring, is represented in the Argentine Republic by thirty species more or less, belonging to the genera *Unio*, *Monocondylæa*, and *Anodonta*, the most of which have been described by D'Orbigny. We mention *Unio psammoicus*, D'Orb., *Unio Patagonicus*, D'Orb., *Monocondylaea minuana*, D'Orb., *Anodonta limosa*, D'Orb., *Anodonta lucida*, D'Orb., etc.; the *Byssodonta Paranensis*, D'Orb., is very common.

The shells of some species of the *Cardicea*, as likewise those of the *Tellinacea* and *Mactracea* families, are found with some frequency on our coasts.

Of the *Cycladidæ* family we again find some fresh-water species; viz., the genera *Cyclas, Azara, Iridina, Castalia,* etc. We cite only the following species: *Cyclas Paranensis*, D'Orb., *Cyclas Argentina*, D'Orb., *Azara labiata*, D'Orb., *Iridina trapezoidalis*, D'Orb., and *Castalia ambigua*, Lam.

Martin de Moussy mentions two or three specimens of the *Solenacea* family, which, according to him, may be met with in the mouth of the Plata.

Some species of the *Pholadacea* come to our coast in vessels; we have seen some pieces of wood in Buenos-Aires completely perforated by these injurious animals.

Tunicata.

Although the *Ascidiæ* and *Botrillidæ* species certainly exist on our coasts, we have no exact information respecting them.

Not far from the Argentine sea-shores however, the pretty and luminous *Pyrosomatidæ* are found, and we have seen them during beautiful nights when we remained a long time on deck.

We cannot assert with equal security that we possess the crystalline and transparent *Salpidæ*; but we have found specimens of a very small species—4 millimetres—in Lat. 32°. Not being adults, we could not determine them.

Personally we know no species of *Brachiopoda* in our latitude, but, according to Hoeven, various species of *Discimidæ* live on the Atlantic coasts of South America.

Although the *Bryozoa*, of the family of the *Lophopoda*—some species of which live in fresh-water—surely ought to exist upon our sea-shores, we know of none as yet. We have seen one or two species of the genus *Flustra*—*Stelmatopoda* family—which were caught on our coast.

ARTICULATA (Arthrozoa).

Referring the reader to what we have said, on page 154, about the Invertebrates in general, we will commence our review of the Articulates; that is to say, of the *Insecta*, the *Arachnida*, and the *Crustacea* successively.

VI. INSECTA (Coleoptera).

The *Carabidæ* are very numerous in the Argentine Republic, although the sub-family of the *Cicindelidæ* is not as rich as it might be supposed to be in a sub-tropical country; we only know

about eight species, among which are some new ones. The genera represented are, for instance, the *Cicindela*, *Megacephala*, etc. Without doubt the sub-family of the *Carabici* is better known, because those *Coleoptera* which are all black or of dark colors, which run so quickly and frequently enter into the rooms at night attracted by the light, and in general disseminate such a strong, acrid, and disagreeable odor, that they are generally called "hediondos"—fetid—belong to it; to wit, the genera *Carabus*, *Calosoma*, *Nebria*, etc. To this family belong some *Coleoptera* of a metallic color—a golden-green or copper tint—as also various species of the genus *Brachinus* and its congeners, which are easily known by the deep-blue color of their wings, and the yellow or light-brown thorax. In the country districts they are generally called "bombarderos," because as soon as they are touched they expel vapor from the anus of a most acrid odor.

The family of the *Dysticidæ* is much less numerous than the former. We only know some black and ordinary species belonging to it, which are found in the "pantanos," or quagmires. We are also acquainted with some species of the family of the *Gyrinidæ*, one of which appears much like the *Gyrinus natator*, L., a European species. We do not recollect having met with the *Palpicornia*, although, if we are not deceived, they are in the Museum of Buenos-Aires. In comparison with the European Fauna, but few species are known of the *Staphylinidæ;* we possess, however, a collection of 50 or 60 species, for the most part unknown. They will be studied by Mr. S. Solsky, Secretary to the Entomological Society of Russia, in St. Petersburg, who for a long time has specially dedicated himself to the study of this group. The larger species of this family are quite rare, whilst on the contrary, a great quantity of pigmies exist in our country. We likewise recognize various small species of the *Pselaphidæ*, as yet new, and also some *Paussidæ*, which have the same peculiarity as the *Brachini*. The *Histeridæ* are represented by some small and large species, and the *Sylphidæ* exist in some pretty species of the genera *Necrophorus*, *Silpha*, etc.

We find the family under the general name of the *Clavicornia* richly represented; we include in it the families of the *Scaphidiini*, *Phalacridæ*, *Nitidulariæ*, *Colydii*, *Cucujini*, *Cryptophagidæ*, *Dermestidæ*, *Byrrhii*, etc. The greatest part is composed of small *Coleoptera*, which easily find the way to our food deposits, whilst others live on flowers and grass. Among the first, many of the Old World are found, imported with merchandize. It is not to be doubted that many new species will be met with after a close study. As examples, we cite the genera *Meligethes*, *Nitidula*, *Cucujus* (?), *Lathridius*, *Cryptophagus*, *Anthrenus*, *Dermestes*, etc.

The family of the *Lamellicornia* is perhaps one of the most interesting of our country, not only on account of its variety in species, but also for the notable forms it presents to the zoologist. We only know a few species of the first group, *Dynastidæ*, but many more of the *Cetonidæ*. The same genus *Cetonia* is represented by some fine species; viz., the *Cetonia lucida* and *Gymnetus tigrina*, G., and some others of a flecked-grey color. We found a species differing little with the *Cetonia aurata*, L., of Europe. The brown, yellow, and black species of the group *Phillophaga* are also numerous; their sizes are different; they fly at the artificial light in our rooms in the evening, and belong to the genera *Hoplia*, *Rhizotrogus*, *Melolontha*, etc. Of the class *Troginæ*, we only mention the species of *Trogus*, which, although óf the same color as the earth, are easily found in the country, on account of their abundance. They are the *Trogus suberosus*, W., *Trogus pilularius*, Germ., *Trox ciliatus*, Bl., *Trox pedestres*, Har., etc. The sub-family of the *Coprophaga* offer various notable species of the genera *Geotrupes*, *Phanæus*, *Gomphas*, *Eucranium*, *Eudinopus*, *Glyphoderus*, *Chæridium*, *Copris*, etc. Not to forget some species which are generally found in heaps of dung, we mention the *Phanæus imperator*, L., the large golden-green dung-eater, with a horn on its head, the *Phaneus milon*, Dej.; *Phanæus Menalcar*, Dej., *Gomphas Lacordairii*, *Copris campestris*, Burm., **Copris cylindrica*, Germ., *Onthophagus hirculus*, Mannersh.; and of the *Ateuchides*, the *Eucranium arachnoides*, Dej., the *Eucranium auritum*, Burm., the *Glyphoderus sterquilinus*, Westw., the *Glyphoderus centralis*, Burm., with various other species and genera. Of the *Lucanides* we only know a pair of small species.

The magnificent family of the *Buprestidæ* is numerous in the Argentine Republic. The indigenous species belong to the following class: *Psiloptera*, *Anthaxia*, *Curis*, *Hyperantha*, *Lasionota*, *Zemina*, *Dactylodes*, *Conognatha*, *Polycerta*, *Ptosima*, *Tylauchenia*, *Chrysobothris*, *Agrilus* and *Brachys*. We will only name the following species, which are numerous: *Psiloptera corinthia*, Fairm., *Psiloptera Tucumana*, Guér., *Anthaxia orientalis*, Burm., *Hyperantha stigmaticollis*, Desm., *Zemina D'Orbignii*, Blanch., *Dactylodes alternans*, Chevr., *Polycesta excavata*, Bl., *Chrysobothris laticollis*, Burm., *Agrilus nobilis*, Burm., **Brachys undularia*, Burm., and various others.

The family of the hoppers, *Elateridæ*, is much better known by the public, because it includes the insects improperly called "fire-flies," which are seen in abundance after sunset in the country; so also the TUCOS, which throw a greater light from the front of the thorax, and are likewise called LUCIERNAGAS—glow-worms. The small species are generally known here by the

name of SALTA-PERICOS. The principal genera are: *Lycus*, *Telephorus*, *Dasytes*, *Lampyrus*—forming the sub-family of the *Lampiridæ*—the *Monocrepidius*, *Pyrophorus*, and others. Some very common species are: *Dasytes pineatus*, F., *Lampyrus Diaphania*, Germ., *Monocrepidius Flavovittatus*, Bl., and the *Pyrophorus punctatisimus*, Bl.—vulg. TUCO.

We do not know many *Cleridæ* existing in this country; but there are two or three *Xylophaga*, species of the genus *Anobium* or *Ptinus*, among which are probably some imported species. The family of the *Melasomata*, in the species of the genera *Scotobius* and *Nyctobates*, etc., is much more numerous.

The *Trachelides* family is represented by some pretty and slender species. The natives use some of them as vesicatories, for instance, the *Pyrota segetum*, Kl.,—the BICHO-MORO—*Lytta punctata*, Germ., and others.

The family of the *Curculionidæ* do not number many species, but our belief is that, if any one dedicated himself especially to its study, a notable collection could be made. When it is known that the species already described amount to 8,000, it would be ridiculous to think that our Republic does not contain a greater number than the 70 species more or less, which we are acquainted with at present, the most part of them being new. The genera we found here are, for instance, the *Cyphus*, *Naupactus*, *Oxyops*, *Listroderus*, *Baris*, *Heilipus*, *Lixus Centrinus*, etc. We will only cite the commonest species; *Cyphus pulverulentus*, Dej., *Listroderus costirostris*, *Heilipus Leucophæus*, and various others. Imported species from Europe will undoubtedly be found in this family. Our honorable colleague Strobel has found two species of the *Bostrichidæ*, genus *Bostrichys*; to wit, the *B. nucinatus*, Germ., and *B. Angustus*, Strob.; we know two others.

We have always admired the fruitfulness of the *Longicorniæ* family; even in the fields where there are no trees it is found in abundance. It is called here GALLITOS. During our short residence in this country we have known 50 or 60 species, of which we will only note the most common: *Mallodon bonaerense*, F., *Trachyderus thoracicus*, *Dorcacerus barbatus*, Dej., *T. dimidiatus*, Guér., *T. striatus*, *T. signatus*, *Achryson undulatum*, Dej., *A. surinamum*, L., *Coccoderus novempunctatus*, Germ., *Clytus acutus*, Germ., *Acanthoderus congener*, L., etc. We have likewise seen some *Lepturidæ*. The larvæ of the species of this family are known by every inhabitant of the country, and are called borers, BICHO-TALADRO.

The number of the representatives of the *Chrysomelidæ* family is moderate. We find the genera *Lema*, *Colaspis*, *Doryphora*, *Chrysomela*, *Chlytra*, *Cryptocephalus*, and others. About twenty-

five species of the sub-family *Cassidæ* are known; to it belong the shield-shaped species with brown and black spots, which are so frequently found in the promenades; as, for instance, the *Poecilapsis octopunctulata*, Dej., *Omoplata flava*, F., etc. Species of the genera *Hispa*, *Haltica*, and *Crioceris* are not wanting either; and, although we know various species of *Erotylidæ*, we cannot mention them here, because our specimens are not yet determined. Nor are the *Holy-Coleoptera* or *Coccinellidæ*, rare here; already we are acquainted with nearly ten species; viz., *Coccinella erythroptera*, Dej.—of which we have observed six generations in a single summer,—*Hippodamia connexa*, Germ., *Epilachna pœnulata*, Germ., etc. The natives call the species of this family—particularly the small ones—VACAS DE SAN ANTONIO, *i.e.*, Saint Anthony's cows.

We have now finished our review of the *Coleoptera*. Thanks to the investigations of Professors Strobel and Burmeister, we know something more of this order than of the others, and therefore have been able to give more details than will be possible with the remainder.

ORTHOPTERA.

The family of the *Dermatoptera*—improperly called TALADRA OREJAS, *i.e.*, ear-borers—is represented by the genus *Forficula*, of which we find four species; one, very large and pallid; a second, very small and light-brown; a third, of mean size almost black, and a fourth, entirely white and tender, which shows a very weak phosphorescent light in the dark from its last two or three segments.

The family of the *Blattariæ* furnishes at least as many species as the last. We know two large ones which are very common in the houses, and are called by the natives CUCURACHAS, *i.e.*, cockroaches; also a smaller species of a clear brown-color; one of the same size, but colored dark-brown, and still another of the same size as the two last, but of a grass-green color. Moreover, we have found here two very small species.

We know at least eight species of the *Mantidæ*. The natives call them MAMBORITAS, or lice-eaters. One species has a small bluish-red eye in its anterior wings; in a second, the wings are completely transparent and green, whilst the posterior wings of a third, are of a bright-brown color. We recognize, moreover, two smaller species of the same green-color, and yet another of a very slim form, belonging to a different genus. Everyone knows the eggs of these insects, which are laid on the branches in a more or less conical form; they resemble gall-nuts at first sight.

The family of the *Phasmidæ*, or spectres, is represented by

various species which the natives call CABALLOS DEL DIABLO, *ang.* Devils' horses; they belong to the *Cladocerus*, *Bacillus*, and *Bacteria* genera. We distinguish nearly ten species, the most of which are 15 centimetres long; we have given to this family the name of *Stelzneria Mendozina*, Weyenb.

The crickets, or *Gryllidæ*, exist among us in several varieties as yet not sufficiently known, among which a very small and pretty species of the *Gryllotalpa*—and probably more of the same genus—is found. Of the crickets properly so called, we determine five dark species of the genus *Gryllus*.

The *Locustina* are not numerous in comparison with the *Crickets*; we have taken two or three species of a grass-green color; there may be more. They frequently enter the houses at night, attracted by the light of the lamps. The *Acridites*, of which we know more than 15 species, are much more numerous. Some are adorned with divers colors, often variegated like parrots, with the under-wings of a bright-red, yellow, or blue color. We note the species *Xiphocera trilineata*, Serv., *X. discoidea*, Serv., *X. viridicata*, Serv., **Rhomalea miles*, *Acridium tarsatum*, *A. Paranense*, Burm., and several others. The last species is so extraordinarily abundant at times, that it passes over the land in untold millions, devouring and destroying all pastures and crops. We have given an account of its visitations during the year 1873, in the Argentine Zoological Journal, I., pp. 33 *et seq.* In the years 1874-5 this species—called by the natives a locust—was most numerous throughout the whole country, but their flights were almost unobserved. The damage done was dreadful. We determine one or two species of the genus *Thysanura*, which belongs to the anomalous *Orthoptera*; also a *Lepisma*, probably appertaining to the species known as *L. saccharina*, L., frequently imported from Europe and North America.

NEUROPTERA.

The families of insects whose larvæ live in the water are not wanting to us, and some of them are even numerous. We will mention a pair of those which do not live in water, of the *Psocina* species, probably imported; also six other species, more or less belonging to the *Termitina*, but these last are not injurious here.

Of the family of the *Perlidæ*, we recognize two species of different size. The largest requires the formation of a new genus, because the tibias of the fore-legs are so wide apart, that they seem like the fore-legs of the genus *Mantis*, and open in the same manner. This insect is greyish-black, and 0 m. 015 in length.

Of the family of the *Ephemeridæ* we observed various large

pilus cæruleus, Tasch., *Spex cortipennis*, Spin., *Scolia rufiventris*, F,, *S. peregrina*, Lep., **S. Servilii*, Guér., *Bembex plavida*, Smith, *Monedula punctata*, F., and various others. The little gnests so characteristic and well-known, which are found adhering to the walls, are the habitations of these insects.

The *Mutillidæ* are here in their element; they are those insects which appear like ants painted different colors, and are well known. We have observed more than 25 species, but cannot enter into more details in reference to them because this family as yet has been studied but little. Of the *Chrysidæ* we only know two or three species; among them is the *Chrysis fasciata*, F.

The ant family—*Formicidæ*—is unfortunately, too well represented in this country. The species which we know belong to the following genera: *Camponotus*, *Brachymyrmex*, *Hypoclinea*, *Dorymyrmex*, *Labidus*, *Atta Pogonomyrmex*, *Pheidole*, *Solenop*-species in the Province of Buenos-Aires; and in Córdoba some small, pretty-species, either allied or belonging to, the genus *Chloë*.

The *Libellulina* are represented by the genera *Libellula*, *Aeschna*, *Gomphus*, *Agrion*, etc. Besides five species of *Agrion*, we already know more than ten species of true *Libellulæ*; the greatest part, perhaps, are new. We will mention the species *Libellula umbrata*, F., *L. Domicia*, Drur., and the fine *L. pullata*, Burm. A sufficient time spent in the regions of the great rivers would doubtless enable us to discover many more.

Of the family of the *Planipennia*, we have observed three species of the genus *Hemerobius*, of which the largest much resembles the *Chrysopa perla*, L., of Europe. The genus *Ascalapius* is represented in Córdoba by two species.

The *Phryganidæ* are quite numerous: near our lamp in the night we have taken various species of the genera *Phryganea*, *Limnophilus*, *Hydroptila*, etc., and we have found their dwelling in the Primero, whilst our honorable colleague Dr. Stelzner brought us from Tucumán various little nests of the *Hydropsyche* and of the *Helicopsyche*. Dr. Burmeister has observed larvæ of various species of *Strepsiptera* in species of *Polistes*.

Hymenoptera.

This order is numerous here, but has been very superficially studied as yet. We have observed many species of bees, *Apidæ*, belonging to the genera *Bombus*, *Xylocopa*, *Anthophora*, *Melipona*, *Cœlionys*, *Anthidium*, *Nomada*, *Osmia*, etc.; viz., the species *Anthidium steloides*, Spin., *Bombus Dahlbomii*, Guér., *Melipona molesta*, Strob., etc.

Much more numerous are the wasps, *Vespidæ*. Of those found among us, we only mention the genera *Polistes*, *Chatergus*, *Ody-*

nemus, *Pterochylus*, etc., and the species *Polistes Americanus*, F., *P. pallipes*, F., *P. morio*, F., which frequently build their nests in the windows and doors of the houses, *Odynerus albocinctus*, Strob., *Chartergus chartarius*, F.—the LECHIGUANA of the natives, who hunt the nests on account of the honey they contain,—as also a species of *Polistes* vulgarly called CAMUATI.

The diggers, or *Fossores*, are presented to our observation in several large species. We recollect the genera of the *Sphex*, *Pepsis*, *Pelopaeus*, *Pompilus*, *Monedula*, *Scolia*, *Bembex*, *Trachytes*, and others, as well as the following species: *Pepsis apicalis*, F., the *P. limbata*. Guér., **Sphex ichneumonea*, Burm., *Pompilus dumosus*, Spin., *P. formosus*, *Saq.*, *Pelopaeus lunatus*, *Scolia campestris*, Burm.. **S. dorsata*, Kl., *Pepsis praesidialis*, Burm., *P. Raumurii*, Dahlb., *P. aciculata*, Tasch., *P. Thoreyi*, Tasch., *P. Thunbergi*, Dahlb., **Prionocnenus cæruleus*, Tasch., *Pomsis*, etc. Of the numerous species we will only mention the *Camponotus bonaerensis*, Mayr., *Hypoclinea humilis*, Mayr., **Dorymyrmex flavescens*, F., *D. tener*, Mayr., **Labidus Strobelii*, Mayr., *Atta cephalotes*, F., *A. striatus*, Mayr., **Pheidole aberrans*, Mayr., *Solenopsis geminata*, F., and various others.

Not less numerous is the family of *Ichneumonidæ*; we have studied the genera *Cryptus*, *Ichneumon*, *Pimpla*, *Bassus*, *Ophion*, *Bracon*, *Fœnus*, and *Evania*. We have taken more than 100 species, but the greatest part is new, and therefore we ought to abstain from giving further details in this place.

We already know a considerable number of the *Chalcidæ* and of the small *Proctotrupidæ*, but proportionally the group of the *Cynipidæ* is reduced, being limited to five species of *Tenthredinidæ*, of which we only remember the *Schizocera flavicollaris*, Dör.

As yet we have not seen any specimen of the *Siricidæ* family.

LEPIDOPTERA.

The graceful order of the Butterflies counts many species in this country, among which there are some really splendid. Nevertheless, the abundance and magnificence of really tropical countries, are wanting to us in this respect.

The diurnal butterflies—*Diurna*—are represented by some species of the sub-family or the *Equites*; viz., *Papilio Phillipus*, *Euryades Corethrus*, *E. Dupronchelii*, Luc. We possess some female specimens just hatched, without any signs of the abdominal appendix, from which fact it may be deduced that the theory of Mr. Sieboldt on the origin of these appendices is entirely correct. We are likewise acquainted with five other species of this group. We know five species also of the genus *Colias*, of the sub-family of the *Pieridæ*, from the environs of

Córdoba, and three species of the genus *Pieris*. The species *Danais Archippus*, L., of the sub-family of the *Danaidæ*, is the most common, although two or three others are not rare. Of the *Nymphalidæ* and *Satyridæ*, we possess perhaps a dozen species, and we have seen at least five species of the *Lycænidæ*, from the suburbs of Córdoba. The sub-family of the *Hesperidæ* is represented by various beautiful species, and we know five species from the Province of Córdoba, of the genus *Goniloba*.

The *Geometridæ* are not so numerous; at least we only know about 50 species, but we believe that by assiduity many more could soon be found near Córdoba alone. The following genera which are known to us are represented: *Ennomus*, *Boarmia*, *Gnophos*, *Zerene*, *Hibernia*, *Cidaria*, *Acidalia*, *Eupithecia*, or their allies. In general, this family has been little studied.

Of the *Sphingidæ* we will only mention the genera *Philampelis*, *Deilephila*, *Protoparce*, *Sphinx*, and the species *Philampelis labruscæ*, L., *P. vitis*, L.—the sphinx of the vine, whose caterpillar is not rare,—a species of *Deilephila* which is much like the *Deilephila galii*, L., of Europe, *Protoparse rustica*, F., the Argentine ESFINGE CALAVERA—*Ang.* skull-sphinx; we know six other species of the *Sphinx*, and some of the *Zygenidæ*.

We have only seen one apecies of the *Xylotropha* family, and that as yet, merely in the condition of caterpillar and chrysalis.

Various species of the family of the *Chelonidæ* are known, but it is not possible for us to mention at present their names, on account of our temporary separation from the Museum which we founded.

Many species of the family of the *Bombycidæ* are found here; viz., the genera *Euclia*, *Liparis*, *Bombyx*, *Io*, *Ceratocampa*, *Oiketicus*, etc. We will only name a few of the most common species, such as the *Euclia diagonalis*, H. S., which, being a kind of *Psyche*, draws its little basket with it; the *Ceratocampa imperialis*, L., whose great green caterpillar is so common on the poplar trees; and the *Oiketicus Kirbii*, Gould, the injurious BICHO DE CESTO Ó CANASTO—*Ang.* basket-worm—of the natives.

The family of the *Noctuidæ*, of which we have the genera *Plusia*, *Acrotis*, *Adena*, *Erebus*, etc., is not less numerous. Some species of *Plusia* and *Agrotis* greatly resemble the European species. Of the genus *Erebus* we will only mention the large species *Erebus odora*, Gram.,—vulg. URA;—the natives hold the erroneous belief that the liquid this butterfly expels after birth is poisonous.

The *Pyralidæ* are quite numerous; we find the genera *Pyralis*, *Aglossa*, *Asopia*, *Nomophila*, *Botis*, *Eurycreon*, *Phacellura*, *Zinckenia*, *Nymphula*, *Crambus*, etc.; the species are, for instance, *Botis rubiginalis*, Gn., **Zinckenia perspectalis*, Hb.,

Phacellura marginalis, Gram., etc. We know one from Córdoba, which, we believe, ought to belong to the notable genus *Acentropus*.

We can communicate but little about the other families of the *Microlepidopteræ*, because on this point the Argentine Fauna has not been sufficiently studied. Nevertheless, we have made a rich collection, and our friend P. C. T. Snellen, of Rotterdam, is at present occupied with its study.

Of the *Tortricidæ* we can only recal the genera *Rhacodia*, *Tortrix*, *Penthina*, *Grapholitha*, etc. Elsewhere we have published the description of the following species: *Rhacodia Solskiana*, Weyenb., *Tortrix ordinaria*, Weyenb., *Grapholitha Hoffmanni*, Weyenb.

Of the great family of the Moths, *Tineidæ*, we have taken about 20 species of *Tinea*, some of *Psecadia*, or of an allied genus, of *Plutelia*, and of *Gelechia*, eight species of *Depressaria*, two or three of *Glyphipteryx*, or of an ally—which live in gall-nuts similar to those of the oak, that are not found on the leaves but on the branches, and have a round opening which, during the life of the caterpillar, is covered by a beautiful top,—some species of *Gracilaria* and of *Elachista*, divers *Lithocolletæ* and *Nepticulæ*; but these last sub-families appear to be quite rare here.

We only know two or three species of the *Pterophoridæ*.

Hemiptera.

It is desirable that this order, which we only know superficially, should be studied in detail.

The following indigenous genera belong to the *Corisiæ* family; viz., *Asopus*, *Cydnus*, *Pentatoma*, *Anisoscelis*, *Lygæus*, *Largus*, and others, which may be classified in various sub-families. We note the following species: *Asopus erythrocephalus*, *Anisoscelis divisa*, H. S., *Lygæus superstitiosus*, F., and *Conorhinus gigas*, F., the detestable and well-known Vinchuca.

We are not aware of any determinate species of the family of the *Membranacei*, excepting the imported *Acanthia lectularia*, L., called here Chinche—*Ang.* bed-bug. We are acquainted with some undetermined species of the *Reduvini*.

The family of the *Hydrocorisiæ*, or acuatic *Hemiptera*, is represented here by some species of the genera *Hydrometra*, *Nepa*, *Belostoma*, *Naucoris*, *Notonecta*, and *Corixa*. Professor Steltzner brought us three species of *Hydrometra* of the lakes of the Cordilleras, and we have elsewhere described a species of *Nepa* whose eggs germinate in the back of the female. The **Notonecta variabilis*, F., has been found in the Paraná, and various species

of the genus *Corixa* fly at night into the apartments attracted by the light, and shortly afterwards are jumping on the table.

Many species of the *Cicadariæ*, the first family of the *Homoptera* group, are found in our regions; we know at least five of singing grasshoppers, *Cicada*, of which without doubt two are new. One of the largest has so strong a voice, that at a distance it resembles the whistle of a locomotive.

Of the *Fulgorina* family, genus *Pœocera*, we only know some pigmy species, which, accompanied by a numerous legion of small *Hemiptera* of the family of the *Membranacei* and by small grasshoppers, *Cicadellina*, enter into our rooms and fly around the lamps. Some *Membracina* are always among them.

We have observed many handsome and large species of the *Aphidina*, or vine-grubs, and some new genera of which we will speak elsewhere. The *Coccina* or cochineals, which we have found are little numerous.

Although we have made a considerable collection of the lice ol birds, *Mallophaga*, we cannot yet communicate any detail in reference to them; they will be studied by Dr. E. Piaget of Rotterdam. Lice, *Pediculina*, are also found here, viz., those of the human race. They have been imported, and multiply abundantly.

Diptera.

It is easily understood that in a sub-tropical country, mosquitoes will not be wanting. Reuniting all the *Nemocera* in a single family,—as more practical for our object—which we will call *Tipulariæ*, we mention the following genera of the different sub-families which we have found represented: *Culex*, *Chironomus*, *Ceratopogon*, *Ptychoptera*, *Aporosa*, *Ctedonia*, *Tipula*, *Polymoria*, *Tanyderus*, *Limnophila*, *Limnobia*, *Erioptera*, *Mycetophila*, *Sciophila*, *Sciara*, *Cecidomyia*, *Lasioptera*, *Psychoda*, *Simulium*, *Scatopse*, *Bibio*, and others.

The Mosquitoes—and particularly in the Autumn, the species which we have called *Culex autumnalis*, Weyenb.—are very importunate. We know more or less, ten species of the genus *Tipula*, various *Limnobiæ* and *Sciaræ*, three species of *Bibio*, six of *Psychoda*, and many of the *Cecidomyia*; viz., the *Lasioptera Hieronymi*, Weyenb., which originates the downy gall-nuts in the willow-trees.

Dr. Stelzner brought us from the Cordillera some pretty species of the *Tabanidæ—Ang.* hornets—and *Asilidæ*; there are many species which present many differences, as much in external form as in color. The largest indigenous species—**Mydas giganteus*, L.—which we have not found as yet, is 4 centimetres in length; the *M. testaceiventris*, Macq., and the *Asilus ruficanda*,

Wied., are other two species which are not rare. The *Empidæ* abound.

We have not yet found any *Henopidæ*, but do not doubt that sooner or later they will be discovered.

The species of *Bombylidæ* are very numerous; we already know more than twenty. The genus *Anthraæ* is particularly abundant; viz., the beautiful species *Anthraæ erethrocephala*, Macq., and *Comptosia bifasciata*, Wied. We know few *Leptidæ* and *Dolichopodidæ*, and only two or three *Platypezidæ*.

Of the family of the *Stratiomyidæ*, the *Hermetia illucens*, L., and the *Stratiomys pulchra* are quite common.

The *Syrphidæ* are not represented by numerous species; we recognize about ten of *Syrphus*, five of *Helophilus*, four of *Eristalis*, and six of *Microdon;* for example, *Microdon bidens*, L., *Volucella spinigera*, etc.

The same occurs with the sub-families of the *Muscidæ;* under the general name of *Muscariæ*, we remark the ensuing genera we have found here among others: *Conops*—four species—*Myopa*, *Tachina*, *Nemoraæa*, *Meigenia*, *Dexia*, *Degeeria*, *Miltogramma*, *Musca*, *Lucilia*, *Pollenia*, *Anthomyia*, *Cordylura*, *Lonchæa*, *Calliphora*, *Sarcophaga*, *Hæmatobia*, *Chyliza*, *Œstrus*, *Hypoderma*, *Gastrus*, etc. As the species for the most part are undetermined, we must reserve a more detailed enumeration for the future; we only mention the following, which we have described elsewhere: *Meigenia Archippi*, Weyenb., *Nemoraea acridiorum*, Weyenb., *Chyliza persicorum*, Weyenb., *Antomyia frutium*, Weyenb., etc. Before long the author will publish a special article respecting the cases of Myasis—or the presence of the larvæ of *Diptera* on the bodies of human beings—observed in this country.

Of the family of the *Pupipara*, we only know a green species of *Ornithomyia*, which lives on the Thrush.

The *Pulcinæ*, or Fleas, are very numerous here, and we already possess a collection of more than 25 species taken from different quadrupeds. The largest and most curious in respect to form, lives on the QUIRQUINCHO *(Dasypus)*: the female is 3·5 millimetres long, and bears the name of *Pulex grossiventris*, Weyenb. The well-known **Sarcopsylla penetrans*, L., called the PIQUE or NIGUÁ—*Ang.* jigger—is found in the Gran-Chaco and Province of Corrientes.

We here end the properly so-called, insects.

MYRIAPODA.

We only know 25 species of this class; two species of *Scutigera*, and eight of the family of the *Scolopendridæ*, the largest of which is more than 15 centimetres long; also the species of *Julidæ*.

Arachnida.

It may be said that the study of the Argentine Arachnida has not yet commenced, with the exception that recently Mr. Holmberg, a student of medicine in Buenos-Aires, has dedicated himself to them. What we know of them at present may be remarked in a few lines.

The *Scorpions* are not rare; we have observed three species in Córdoba, and a very large one—six centimetres long—was brought to us from the Cordillera.

The *Pseudo-scorpionidæ* are more or less designated by ten species of *Chelifer*. We have seen a species of the genus *Opilio* at Mr. Holmberg's, called by him *O. Weyenberghi*, Holmb.

The *Mygalidæ* are not wanting, and it is said that the **Mygale aricularia*, L.,—one of the largest species,—exists in the Province of Corrientes and in the Gran-Chaco.

We have collected various species of the *Orbitelæ*, *Inequitelæ*, and *Tubitelæ* families, and have sent them to our friend Professor T. Thorell of Upsal, who will study them.

We believe that the *Laterigradæ* are rarer, but we know various species of the *Citigradæ*.

We will only mention here the *Epeira socialis*, Reng., of the family of the *Orbitelæ*, on account of its habit of living in society, as well as for the practical use which is made of its beautiful orange-colored coccoon, which is textile.

We are already acquainted with eight species at least of the family of the *Saltigradæ*.

Of the family of the *Acarinæ*, or Mites, many imported species are found here. We have observed especially the ensuing families: *Bdellidæ*, *Trombididæ*, *Hydrachnidæ*, *Gamasidæ*, *Ixodidæ*, *Acaridæ*, and *Demodecidæ*.

The *Gamasidæ* are very abundant on almost all of the *Coleoptera*. We know very large species of the genus *Gamasus*, which live in the common dung-beetle. We are at present occupied with a monographic description of the *Ixodidæ* family, many species of which are called here Garrapatas; almost every quadruped suffers from them.

Of the *Trombididæ* family we will only name the well-known and vexatious insect—both to man and animals—called here Bicho colorado—*Ang.* red-tick—which belongs to the genus *Tetranychus; Leptus* is only the larvæ of this genus. This species is easy to distinguish from the South of Europe *Tetranychus (Leptus) autumnalis*, and, inasmuch as we do not find its scientific name anywhere, we call it *Tetranychus molestissimus*, Weyenb.

Many persons are met in the Interior of the country with

pustules in the face, which appear to us to be caused by *Demodecidæ*, or by the *Dermatophagoides Scheremetewskyi*, Boyd.

The *Linguatulinæ* are also found here. We can assert their presence, because we found a beautiful and large *Pentastomum* of nearly six centimetres long in the nasal cavity of a cougar. Doubtless more species will be found.

IX. CRUSTACEA.

What we have said about the marine Fauna in reference to the fish and the mollusks, is even more certain respecting the marine *Crustacea*. On this point our knowledge is still more rudimentary, and we know almost nothing about the fresh-water species.

The families of the *Cyclometopa* and *Catometopa* are without doubt, found on our coasts, but we have not seen any specimens. Perhaps the species *Oxyrhyncha*, *Oxystomata* (?), and *Notopoda* may also be found. De Moussy mentions a species of *Gecarcinus* or *Oxypoda*, as inhabiting the mouth of the Plata. The *Hippidæ* and species of *Pagurus* are also found there. It is said that a pretty species of the *Loricata* family, genus *Palinurus*, is found at the island of Lobos. Various species of the genera *Astacus*, *Homarus*, etc., of the *Astacina*, live not far from our coasts, some being also found in the rivers; viz., the **Potamergus platensis*, Burm., in the River Paraná.

We have been told that from time to time, a species of crab is seen in the market of Buenos-Aires, but during our residence in that city—once of six weeks and again for five months—we could not find it. We have the certitude, however, that species of the *Caridinæ* must be found on our coasts.

De Moussy mentions a species of the famiiy of the *Gammarinæ* —*Arthrostraca* group—of the genus *Gammarus*, which, it is said, is eatable. Of this genus we know quite a large species brought from the lakes of the Cordillera by Dr. Stelzner, as also a pair of parasite *Crustacea* of the family of the *Hyperina*, which live on sea-fishes.

Although we have not found the *Asellidæ*, we have collected about seven species of the family of the *Oniscidæ* or *Cloportes*, two of which appear identical with the European species, and have probably been imported.

Admitting that it is generally known that the **Limulus Polephemus* is met with on the Eastern shores of both Americas, it appears that this species does not inhabit our coasts.

In our fresh waters we have not as yet observed any species of *Branchipodæ*, *Apusidæ*, *or Estheridæ*, although the group *Claderocera* has been found.

Notwithstanding we have searched a great deal for the *Copepoda*, we have not been able to meet with more than two or three species; we believe that this family is rare in South America. Nor have we seen as yet any species of the *Cirripedes* and *Rotatories*, but doubt not that the first are found on our coasts, and the second in our lagunes and ponds.

X. ANELIDA (Vermes).

Inasmuch as this review of the Articulata is only rudimentary, even in comparison with that part of this chapter which treats of the classes of Vertebrata, nevertheless the two first classes of Invertebrata—mollusks and articulates—have taken as much space as the four classes of Vertebrates—the mammifers, the birds, the reptiles, and the fish. Therefore the space at our disposition is nearly disposed of.

For this reason it is necessary to be yet more concise, in speaking of the four classes of Invertebrates which are yet wanting in our enumeration; viz., the worms, or Annelida, the Echinoderms, the Acalephæ, and the Protozoa. The advantage will be ours, however, because our knowledge of these animals in the Argentine Fauna is hardly yet, we may say, in embryo, and therefore their study is still to be commenced.

We can say nothing about the ensuing families, even when there is no doubt that some of their species may be found on our coasts; viz., the *Aphroditea*, *Eunicea*, *Lumbrineria*, *Amphinomea*, *Nephtydia*, *Nerinea*, *Cirratulea*, *Nereidea*, *Hesionea*, *Ariciea*, *Chætopterida*, *Arenicolea*, *Chloræmia*, *Hermellacea*, *Terebellacea*, *Serpulacea*, *Maldania*, etc. We have seen two Argentine species of the *Serpulacea* family.

Various representatives of the family *Lumbricina* are found here; we recognize at least ten undetermined species. One of these appears much like the *Lumbricus terrestris*, L., of Europe. We do not distinguish any maggots or grubs, nor species of the littoral families *Echiuræ*, *Sipunculaceæ*, and *Onychophora*.

Some *Echinorhynchidæ* are met with as parasites of various domestic animals; as also the *Ascaridæ* in the greater part of the mammifers, birds, reptiles, and fishes. We have found a pretty species, white as ivory and six centimetres long, in the intestines of the *Dasypus villosus*, and we have given it the name of *Ascaris eburnea*, Weyenb. We recognize among others the following genera: *Leptodera*, *Heterakis*, *Ichthionema*, *Sclerostomus*, etc. Sometimes spécies of the families *Mermidea* and *Gordiacea* are found among the insects; viz., *Mermis acridiorum*, Weyenb.,

in the *Acridium Paranense*, Burm., *M. elegans*, Weyenb., etc. We distinguish, moreover, two species of the genus *Gordius*, of 1·5 decimetre long, which live in the aqueducts; one is black and the other white. The natives believe that they are horse-hairs, which, after remaining a certain time in the water take life, owing to fermentation.

The *Turbellaria* are met with in abundance, but as yet it is impossible to name either the genera or the species.

The *Hirudinidæ*, or leeches, are not rare in the rivers and streams. De Moussy mentions some species, recommending their medicinal utility, and says that they ought to be preferred to the imported variety—*Hirudo medicinalis*, L. We have seen only two or three species in the aqueducts of Córdoba, some of which belong, we believe, to the genus *Aulostoma*, and others to the genus *Clepsine*.

The species of the family *Trematoda* abound as parasites of fresh-water fish; viz., the genera *Polystoma*, *Distoma*, *Monastoma*, etc. One of the most common is the *Amphistoma pulcherrima* Weyenb., which we have abundantly found in the *Hypostomus plecostomus*. They are generally discovered entwined in the form of a ball, but as soon as they are detached and placed in a plate, they begin to move and untwist themselves.

The family of the *Tæniadea* is not less numerous. In man is found the *Tænia solium*, L., or Tape-worm, as well as the *Botriocephalus lotus*, L.—both imported—and we have found species of this family in almost all the animals which we have dissected, whether birds, mammifers, serpents, or fish. They are particularly abundant in the birds.

ECHINODERMATA.

The Fauna of the Argentine coast being known as yet only in an elemental manner, it is evident that we can say little about the Echinoderms, but inasmuch as some genera of the *Holothuriæ* family exist in all the seas, they cannot be wanting in ours; nor is it doubtful that species of the *Molpodiæ* will also be found.

We have seen shells of two species of the *Echinides—Ursini—* which had been taken on our coasts, and it is said that the species *Scutellina* is not rare there. Agassiz mentions two species of *Spatangea* found not far from our shores.

We believe that the *Urasteridæ* have not yet been met with among us, but as this family is very cosmopolitan, there will be no motive for surprise should its representatives be found when a scientific exploration of the Argentine coasts be made. We

have seen near Monte-Video a specimen of the genus *Astropecten* at the bottom of a fisherman's bark, where it was doubtless kept as a curiosity. If the species did not belong to this genus—which we cannot affirm at present—at least it belonged to this family. It is very probable that species of the genera *Asteronyx* and *Trichastes* will likewise be found here. We can say nothing about the *Ophiura*, but it is long since some six sea-species of *Comatulidæ* are known in Argentine latitudes.

We will state *en passant*, that Professor Stelzner collected several fossil *Crinoidea* during his voyage to the Andes; in the geological part of this book more details will be found respecting them.

Zoophytes *(Coelenterata)*.

The Acalephæ, to which we have united here the Polyps, in greater part are marine animals. If they are found here they must belong to the *Mnemiidæ* family, because the other families belong exclusively to the tropical seas. According to a communication from a Dutch captain, a species of *Beræ* is not rare here.

At a certain distance from our shores we have seen some species of the *Medusidæ* family, among which probably are some species of *Pelagidæ*. Agassiz found some species of *Cepheidæ* and *Æginі* in our seas.

In reference to the *Hydroidea*, we can only say that we have preserved a *Sertularia*, taken in our presence from the bottom of the ocean between Rio de Janeiro and Monte-Video.

Although we have searched in the fresh-water for many species of *Hydra*, we have not been able to find them in the Argentine Republic, but the *Siphronophora* are not rare, at a certain distance from the coast.

We pass in silence the numerous families of Zoophytes which are wanting here, and limit ourselves—respecting the Polyps—to saying that we know specimens of the *Actinidæ oculinadæ*, *Astræidæ* and *Madreporidæ*; every now and then fragments of some species are found on board vessels.

There is no doubt that the *Pennatulina* is found on our coasts, but we have no data respecting it, which is also the case with the Zoophytes in general.

Protozoa.

Surely it is not necessary to assert that many species of this class are found in the Argentine Republic, whether on the coasts or in the rivers, in the lakes, and in the mountains, on the surface or in the mines, in men, in animals, and in plants, even as they are found in all parts of all countries.

The *Eusprongidæ* are doubtless found in the Atlantic Ocean, not far from our coasts; but we have not yet seen sponges of fresh-water.

Respecting the *Rhizopoda*—Foraminifera—we refer the reader to the "*Voyage dans l' Amérique Meridionale*," T. V, part 5, of D'Orbigny, because we cannot take the space here, our enumeration would be too extensive; nor has our short stay in this country presented any occasion to make observations upon this group.

We have seen *Gregarineæ* of the genus *Gregarina*, in the hair of uncleanly persons; and we have observed the *Noctiluqaiæ* in the Atlantic Ocean in our latitude, and *Infusoria* in larvæ of aquatic insects, particularly the larvæ of *Friganæ*; viz., the species which we have described by the name of *Amphimonas irregularis*, Weyenb., which is very common.

CHAPTER IX.

THE CHEMICAL AND PHYSICAL PROPORTIONS OF THE SOIL IN THE PAMPA FORMATION.*

DURING our excursion made at the beginning of this year, for the Public Museum of Buenos-Aires, a collection was made of the different classes of soils of the Pampa between Rosario and Córdoba, for the purpose of making a chemical analysis. This caused some observations to be dedicated to the chemical and physical proportions of this soil of the Pampa, whose results we will endeavor to explain in the following pages.

Specimens of the soil were sent from Córdoba, Rio Segundo, Laguna-Larga, Chañares, Villa-Maria, Tortugas, and Rosario, all stations on the Central Railway. Only those from Córdoba, Rosario, and Villa-Maria were chemically analysed.

I. SOIL FROM CÓRDOBA.

Taken from the hill near the Astronomical Observatory, about two metres under the surface; soft and large-grained, very sandy, with loose small scales of mica; composed of 15.26 per centum of remains of *soroche* † determined by the influence of the air, and 84.74 per cent. of the same mineral in a good state.

Hygroscopic property 23.5 per cent.; diameter of the largest grains of quartz, 2 MM. and even more.

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* By Professor A. Doering, Dr. Sc.

† A shining and brittle mineral, with a little silver in it. *(Note by Transl.)*

Aggregate of the constituents;

Oxyd of potassium.....	Ka^2	O	—	—	3.099
" sodium.....	Na^2	O	—	—	1.180
" calcium.....	Ca	O	—	—	3.328
" magnesinm.....	Mg	O	—	—	0.474
" manganese.....	Mn^3	O^4	—	—	0.145
Sesquoxyd of iron.....	Fe^2	O^3	—	—	2.929
" aluminium.....	Al^2	O^3	—	—	10.899
Silicic acid	Si	O^2	—	—	73.803
Phosphoric do.	P^2	O^5	—	—	0.657
Hygroscopic water.....			—	—	1.119
Lost in the fire.....			—	—	2.367
H^2O, CO^2, NH^3					
					100.000

a) *Quartz and remains of rock:*

Calculating the whole of the soil in 100 parts..

Oxyd of potassium.	Ka^2	O	—	3.049	—	3.598
" sodium....	Na^2	O	—	0.816	—	0.963
" calcium...	Ca	O	—	0.360	—	0.425
" magnesium	Mg	O	—	0.445	—	0.525
Sesquoxyd of iron..	Fe^2	O^3	—	0.608	—	0.717
" aluminium	Al^2	O^3	—	8.497	—	10.027
Silicic acid	Si	O^2	—	70.960	—	83.745
				84.740 %		100.000

b) *A mixture deteriorated by atmospheric agents:*

Oxyd of potassium	Ka^2	O	—	0.050	—	0.327
" sodium....	Na^2	O	—	0.364	—	2.389
" calcium...	Ca	O	—	2.968	—	19.449
" magnesium	Mg	O	—	0.029	—	0.190
" manganese	Mn^3	O^4	—	0.145	—	0.950
Sesquoxyd of iron...	Fe^2	O^3	—	2.321	—	15.209
" aluminium	Al^2	O^3	—	2.402	—	15.740
Silicic acid.....	Si	O^2	—	2.838	—	18.597
Phosphoric do.	P^2	O^5	—	0.657	—	4.305
Lost in the Fire....			—	3.486	—	22.844
				15.260		100.000

II. Soil from Villa Maria.

Taken from the neighborhood of the station, about two metres beneath the surface; somewhat light and very easily crumbled; fine earth of the color of yellow-clay. Without the aid of the microscope an infinity of small scales of mica are seen, with loose little-grains ot titanic iron and sand.

The mixture is composed of 61.514 per cent. of material which has not suffered from the influence of the air, and of 38.486 per cent. which has so suffered.

Hygroscopic property, 28.0 per cent.

Diameter of the largest grains of quartz, 0.15-0.20 MM.

Aggregate of chemical constituents:

Oxyd of potassium.....	Ka^2	O	—	—	2.852
„ sodium.....	Na^2	O	—	—	2.633
„ calcium.....	Ca	O	—	—	3.568
„ magnesium.....	Mg	O	—	—	1.954
„ manganese.....	Mn^3	O^4	—	—	1.034
Sesquoxyd of aluminium....	M^2	O^3	—	—	16.673
„ iron.....	Fe^2	O^3	—	—	4.741
Silicic acid.....	Si	O^2	—	—	59.941
Phosphoric do.....	P^2	O^5	—	—	0.517
Lost in the fire.....		—	—	—	3.509
Hygroscopic water.....		—	—	—	2.578
					100.000

Remnants of rock which have not suffered alteration from the influence of the air.—Aggregate of the soil calculated in 100 parts:

Oxyd of potassium....	Ka^2	O	—	2.241	—	3.643
„ sodium.....	Na^2	O	—	0.248	—	0.405
„ calcium.....	Ca	O	—	2.078	—	3.377
„ magnesium..	Mg	O	—	0.313	—	0.509
Sesquoxid of aluminium	Al^2	O^3	—	8.133	—	13.221
„ iron.....	Fe^2	O^3	—	0.830	—	1.349
Silicic acid.....	Si	O^2	—	47.314	—	76.916
Phosphoric do.....	P^2	O^5	—	0.357	—	0.580
				61.514		100.000

Material deteriorated by the influence of the air:

Oxyd of potassium....	Ka^2	O	—	0.611	—	1.587
„ sodium.....	Na^2	O	—	2.385	—	6.197
„ calcium.....	Ca	O	—	1.490	—	3.871
„ magnesium..	Mg	O	—	1.641	—	4.267
„ manganese ..	Mn^3	O^4	—	1.034	—	2.686
Sesquoxyd aluminium	Al^2	O^3	—	8.540	—	22.189
„ iron.....	Fe^2	O^3	—	3.911	—	10.162
Silicic acid.....	Si	O^2	—	12.627	—	32.893
Phosphoric do.....	P^2	O^5	—	0.160	—	0.415
Lost in the fire.....	(+ water)		—	6.087	—	15.817
				38.486		100.000

III. Soil from Rosario.

From the neighborhood of the railway station, about $2\frac{1}{2}$ metres below the surface. Dark, compact marlacious earth, difficult to pulverize. It turns still darker during ignition, because it contains organic materials. The mass becomes very much pulverized, and is not distinguishable by the natural sight; 58.688 per cent.

which has not suffered, and 41.312 per cent. which has suffered from the inclemency of the atmosphere. Hygroscopic property, 31.2 per cent.

The diameter of the largest grains of quartz, 0.04-0.08 MM.

Aggregate of chemical constituents:

Oxyd of potassium.....	Ka^2	O	—	—	1.808
" sodium.....	Na^2	O	—	—	0.817
" calcium.....	Ca	O	—	—	1.963
" magnesium.....	Mg	O	—	—	1.471
Sesquoxyd of iron.....	Fe^2	O^3	—	—	2.244
" aluminum.....	Al^2	O^3	—	—	16.037
Silicic acid.....	Si	O^2	—	—	67.189
Phosphoric do.	P^2	O^5	—	—	0.303
Hygroscopic water.....		—	—	—	3.383
Loss in the fire		—	—	—	4.785
($C0^2$, NH^3, H^20)					100.000

a) *Remnants of rock and quartzose sand, which have not suffered by the inclemency of the air:*

Oxyd of potassium..	Ka^2	O	—	1.443	—	2.459
" sodium....	Na^2	O	—	0.301	—	0.513
" calcium ..	Ca	O	—	1.553	—	2.647
" magnesium	Mg	O	—	0.182	—	0.310
Sesquoxyd of iron...	Fe^2	O^3	—	0.354	—	0.603
" aluminum.	Al^2	O^3	—	3.711	—	6.322
Silicic acid.....	Si	O^2	—	51.144	—	87.246
				58.688		100.000

b) *Material which has suffered by the inclemency of the air:*

Oxyd of potassium.....	0.365	—	0.883
" sodium.....	0.516	—	1.249
" calcium.....	0.410	—	0.993
" magnesium.....	1.289	—	3.120
Sesquoxyd of iron	1.890	—	4.575
" aluminum.....	12.326	—	29.837
Silicic acid.....	16.045	—	38.838
Phosphoric do.....	0.303	—	0.734
Loss in the fire and water.....	8.166	—	19.791
	41.312		100.000

It appears from all the observations on comparing the physical character of these specimens of earth, that a gradual change from coarse to fine soil takes place in the direction from the foot of the Sierra of Córdoba towards the shores of the Paraná. The gradual slope of the surface in the same direction, without any perceptible disorder in the horizontal stratification of the different strata of the earth, is a characteristic sign of the topographical formation of this Pampa. Moreover, the extraordinary uniformity of the surface, and the uninterrupted continuity of the plain, renders it beyond doubt that its formation, as well as the causes

from which it proceeds, belong to the same epoch. The following phenomena in reference to the physical quality of the different classes of soil, are in immediate relation to these circumstances:

1. Let us take from the shores of the Paraná, a compact and regularly-mixed deposit of the terrenal strata, composed of substances as fine as dust, and in contraposition, a porous and movable deposit from the layers of Córdoban earth, which was found *accompanied at the same time* by a greater and more rapid change in the material of which it is composed. The greater dryness of the different earths in the Province of Córdoba, in contradistinction to those of the Province of Santa-Fé, enables the rains to penetrate with greater rapidity, and therefore it results that after the heaviest rains, the soil of Córdoba readily dries upon the surface, whilst on the littoral lands of the Paraná, the rain-water is ponded upon the surface for a long time, and can penetrate but slowly the strata of the earth.

2. The more pronounced preponderance of the soil on the shores of the Paraná, respecting its hygroscopic properties.

Analysed earths gave the following proportions:—

			Per cent. of water.				
Soil of	Córdoba.....	—	23,5	%	1,119	%	Hygroscopic water contained in soils dried in the air.
„	Villa-María.....	—	28,0	„	2,498	„	
„	Rosario.....	—	31,2	„	3,383	„	

The difference is easily explained, as much from the fine pulverization of the material on the Paraná, by which the attraction of the plain is augmented in the same proportion, as on account of the greater quantity of silicates of aluminium which possess this property in a very high degree.

Considering the material under view composed of inconstant marl—oxyd of alumina—and taking as a base the formula:—

$$2\,{}^{Si}\left\{\begin{matrix}O\\O\\O\\O\,H\end{matrix}\right\}{}^{Al}+H^2O$$

—silicate of aluminum—the following proportion results from the specimens of earths analysed:—

Amount of marlaceous earths in them:

		In the mass of earthy constituents.			In the same, deteriorated by the action of the air.	
Soil from	Córdoba.....	—	6.0	%	—	39.5 %
„	„ Villa-María	—	22.4	„	—	55.8 „
„	„ Rosario	—	30.9	„	—	75.0 „

Nevertheless, it may be understood that this result ought not to be considered as showing the proportions—not even approximatively—because the different localities and strata of the Pampa earth especially in the lands nearest to the Sierra of Córdoba, are very distinct in their materials, so much so that where some

deposits of feldspar exist deteriorated by the influence of the air, they alternate with others which are arenaceous, and only by a larger number of analyses would it be possible to obtain a result in accordauce with the true average.

Whilst in the environs of Córdoba the fragments of gneiss or granite from the neighboring Sierra, are easily recognized in the constitution of the soil, as well as in the fallen rocks not mixed with others, this notable aspect disappears in the primitive character of the soil the farther it may be distant from the Sierra, the mixture increasing in firmness in direct ratio with the action of atmospheric agents.

In the centre of these Pampean regions, principally between Rio-Segundo and Villa-Maria, scales of mica appear to be deposited. Towards the fields, on the shores of the Paraná, a small diminution is discerned in them, it being impossible to distinguish them by the natural sight, on account of the extreme firmness of the particles which compose these earths; and even for a microscopical examination, the mixed remains of rock certainly augment the difficulty if they are of trachitic or granitic origin, inasmuch as the principal component parts of these rocks, so far as regards their mineralogical representation, are the same, and only a difference in their quantities determines their character.

On the other hand, the extraordinary abundance in those localities of combined deposits of lime in the form of *tosca*, are interesting for the determination of this question, as, from their abundance and size, it is probable that, at the same time with the fragments of granitic rock, greater quantities of lime were deposited, which corresponds to the proportional amount of combinations of this substance in the feldspar rocks. This, therefore, reveals a remote origin, in which the same unequal proportion of lime existed in comparison with the granitic rock, as is found in the vast beds of marble in the granitic region of the Sierra of Córdoba, and in those which are in genetic connection with them.

Let us consider these circumstances, and it will not be difficult to form a sufficiently clear idea of the antecedents of the formation of this soil of the Pampa. We observe, first, the uninterrupted connection and descent of the plain; let us follow, and cross the Pampa from the Sierra to the Paraná, the gradual changing of the largest to the finest hard-particles, which begins at the foot of the Sierra with masses of boulder-stones of great size, and which ends on the shores of the Paraná in the finest dust: and, finally, we will endeavor to form an idea of the activity of the river-mud, by following the rivers which yet rise in the Sierra and run in that direction, carrying with them the earth which has been torn away from the same Sierra, this earth constantly increasing in fineness according to the distance it has pass-

ed over. Hardly any doubts will then remain, that during the formation of this land of the Pampa, analogous phenomena, although modified and more grand, took place.

We are therefore, in presence of the same phenomena which is found throughout the globe, as diverse in their forms as in reality they are analogous, whether they be found at the foot of the Sierra of Córdoba in South America, on the margin of the Rhine in Europe, or in the greatest part of the rivers of Asia and Africa. These consist of the gradual crumbling of the eruptive crystalized rocks, considered by the greatest part of the geologists on account of its general extent over the globe as the primitive stratum of the surface, and which is principally composed of a mixture of the three minerals, quartz, mica and feldspar.

The violence of the crumbling caused by the atmospheric precipitations which follow each other and return during long periods, and which for this reason are so powerful; and again, the constant wear of the Ocean waves; produce a gradual dwindling of the rocks into smaller pieces, a modification whether in their mineralogical constitution or a chemical alteration of this last, and a simultaneous carrying away of the whole by the movement of the waters.

The Sierras of Córdoba and Catamarca, etc., which cross the West of the Argentine Republic, are neither in their size, extent, or external form, the same as they were in periods of evolutions on the surface of the globe: they form only a part, the skeleton —if I may be permitted the expression—of a greater mountain, which under the influence of air and water and during an incalculable space of time, has gradually changed its form and lost in size, throwing off its material by the alteration and decomposition of its surface, it being constantly carried to the valley by the waters; and this forms the lands of the Pampa. The wide ravines in the Sierra itself; the division of one cordillera in groups or summits, separated one from the other, and the less precipitous slopes; are proofs of an operation which has taken place in parts very gradually, each wide incision of the valley probably corresponding to a narrow fissure in the primitive Sierra, but whose existence permitted the access of the air and water to the interior surface of the rock thus exposed.

The diverse constituents of these rocks in disintegrating, proceed in very different manners. The crystalized quartz which is characterized by its inalterability — subjected to the influence of meteoric waters and above all not subject to disaggregation, is only affected by the mechanical action of crumbling and friction under the perpetual force of the waters. It is found with its qualities unaltered, as grains of sand deposited in the sediment left by the waters whose force has carried

them along. In consequence of their inalterability, it serves principally from the relative size of its fragments, as an important point in the solution of questions relative to the velocity or force of the waters which brought down those fragments: or to explain the length of the distance they have been removed from their primitive bed, particularly in those cases where the fragments of rock which accompanied them, were submitted to a decomposition in whole or in part. Because, to move á grain of sand of a determinate size and weight, in level earth, a certain velocity is first necessary in the water, whose density it is also necessary to verify previously. However this may have happened in greater or less degree, the transit of the fragments of rock is more or less rapidly effected, thus being equivalent to greater or less distances.

What has been observed about the inalterability of quartz, is also true to a certain degree of the second principal constituent of the granite-rocks, and of the sediments which come from them.

The silicate of alumina and potash $\left(\begin{matrix} Si \left\{ \begin{matrix} O \\ O \\ O \end{matrix} \right\} Al \\ O\ Ka \end{matrix} \right)$ which is not wanting in any of the specimens of earth we possess, offers a resistance —if not complete always quite pertinacious—(Mulder, *Chemie der Ackerkrume*, Tom. I., p. 576), to all desintegrating action, (Bischoff, *Lehrb. der chem. u. phys. Geologie*, Tom. I. p. 1216 or 1577); so that among the sedimentary rocks and their products of disintegration, it generally preserves its physical qualities invariable. (Naumann, *Lehrbuch der Geognosie*, Bd. I. S. 726).

On the contrary the effects of the crumbling are very different in the feldspar, the third principal constituent of those rocks. The tendency of this mineral to disaggregate was already known by Werner in 1794, which he attributed to the influence of water and carbonic acid, an opinion which remains as yet unchanged (Naumann, *ut sup. O. S.* 747).

In 1826, Struve proved by his experiments that the water which contains carbonic acid extracts alcali from granitic rocks (Roth, *Beiträge zur Petrographie der pluton. Gesteine*, 1869 p. 129). Fournet in 1833, (Mulder, *Chemie der Ackerkrume*, Bd. I. 144), and Forchammer in 1835, (Poggendorffs *Annalen*, Bd. XXXIII, S. 331) called attention to the metamorphosis of the feldspar in silicate of aluminum. A multitude of other investigations were added to their labors which only served to perfect and modify the first opinion; that, according to the class and composition of the feldspars *Orthoclase*; ($Ka^2\ Al^2\ Si^6\ O^{16}$) *Albita;* ($Na^2\ Al^2\ Si^6\ O^{16}$) *Oligoclase;* ($Na\ Al^2\ Si^5\ O^{14}$) not only the simple silicate of aluminum comes from them: $2 \left(\begin{matrix} Si \left\{ \begin{matrix} O \\ O \\ O \end{matrix} \right\} Al \\ O\ H \end{matrix} \right) + H^2\ O$, but that at the

same time, the polysilicates of diverse constitutions: whilst a great part of the silicic acid remains free, being at the same time liberated and gradually washed together by the water with the contents of the alkali of the feldspar, in which operation if the oxyds of potassium and sodium exist, the latter is carried down more rapidly and fully than that of potassium. (Naumann, *ut sup.* O. Roth, *ut sup. O.*).

From the hard and crystalized mineral is thus produced under combination with hygroscopic water, the amorphous marl which, owing to its great friability and increasing attribute of attraction, exercises the greatest influence over the physical qualities of the different classes of earths, in proportion to the greater or less quantity which may be mixed with them. Aside from its characteristic of absorbing different salts, principally the combinations of potasium, of amoniacum, etc., it exercises a great influence upon the hygroscopic force of the water of the earths, and serves as a reservoir for many nutritive inorganic matters, which are indispensable to the growth of plants, and which are preserved by it from the influence of the waters in the earth.

Let us now follow the history of the fragments of rocks which by the influence of the exhalations or atmospherical accidents, and by the circulation of liquids in the porous texture of the rocks, are gradually loosened and carried to the valley. By mutual friction under the action of water which always runs down, these fragments of every size are submitted to the activity of the waters which separates the lightest and smallest from the larger, and carrying the former to greater distances, the latter are deposited but slightly separated, at the foot of the mountain. The minerals which compose those rocks being very distinct from each other in hardness, the crumbling operation to which the rolling fragments are submitted, cannot operate with equal intensity upon all.

Apart from the diversity in friability of the minerals, for which there exists no relative standard, the quartz on account of its hardness as 6 to 1 is less easily pulverized than the feldspar; the mica being yet more (D = 2-3) exposed to disaggregation, as also the marmoraceous lime (calcareous spar D = 3-5); these circumstances must therefore, be taken into consideration. On the other hand, on comparing the specific gravity of those minerals, which is of mica = 2,8-3,1; of feldspar = 2,6; of quartz = 2,4-2,8; of calcareous spar = 2,2-2,8; the operations of the dislocation of the three first minerals would be somewhat compensated, because that one which is the least hard and the easiest to break—mica—has the greatest specific gravity, although we must recollect that the great extension of the fragments of mica in the plain, offers more favorable dispositions for an easy transport by the waters, than the

fragments of the other minerals in general more compact. But the calcareous spar on the contrary, presents qualities evidently favorable in both senses to its removal to great distances; and thus the extent of the deposits of lime—*tosca*—in the districts of the Paraná far from the Sierra, are accounted for, and their small quantity or entire absence in the alluvial lands near the Sierra.

However, a complete separation of the minerals by the action of the water is never established, they are always deposited more or less mixed, the smallest fragments of those of the greatest specific gravity, being carried the same distance as the larger ones of less weight. Moreover, the force or velocity of the waters being subject to periodical changes, at the same time forming irregular layers, no where can a uniform deposite of fragments of rock of the same nature and size be found, but only an irregular mixture of them.

The feldspar presents in a relatively slight degree the quality of disaggregation, which it is very apparent occasions its transport, or at least that of the products of accumulated pulverization, to distant points.

The amorphous, voluminous marl, which is subject to dislocation in a high degree, springs from the firm mineral; but the disintegration of the mineral which already begins in the compact rock of the Sierra, continues during the whole course of its voyage, and constantly provides during this proceeding new matter of fine soil, which under these circumstances is deposited as sediment in distant localities, thus considerably augmenting the relative quantity of marl.

The considerable amount of aluminum found in the soil of Rosario, characterizes all the territory of the low-coasts of the Paraná, as may be immediately ascertained from the compact and cretaceous quality of the classes of soil between Rosario and Buenos-Aires.

In the preceding lines we have described the alluvial phenomena which still present themselves on account of the activity of the rivers of the Sierras, but we have yet to investigate whether they serve to enlighten the study of the formation of the Pampa. Although the hypothesis that the Pampa was gradually formed by the activity of the rivers in the great extent of the plain, contains little probability in itself, even this disappears when the phenomena which accompany the action of the rivers, are considered. In all parts where the plain of the Pampa is crossed by currents of water, these cause alterations in the normal and uniform state of the strata of the earth. On the one hand they cause by erosion, deep fissures and irregularities in the form of the surface; and on the other, the size of the fragments which they carry down and deposit, always exceeding that of those which are found in the

plains of the neighbouring lands, as happens in the districts of the Rivers Primero, Segundo, etc. proves, that the movable waters at present in that territory, are driven with much greater force and velocity, than those under whose influence the terreous formation of the Pampa was effected.

The singular and uniform level of all the Pampa territory is also opposed to that theory. Even admitting that the dust of the S. West, or *pampero*, wind, may have largely contributed to the formation of this plain, this could not explain the uniformity of such a large space of land. And thus all these characteristics conduce to the only probable supposition, that a great sea covering the whole level, occasioned the formation of the Pampa by the uniform movement of its waves.

Under this supposition the phenomena of the inundations and depositions of the terreous constituents, although analogous to the inundations of the rivers at present, have always been modified in the course of their evolution, and less determinate, especially in their regular changes.

In this case we would have to imagine the existence of permanent waters whose limits would be shown in part by the Sierras of San Luis, Córdoba, Catamarca, etc. A current of water occasioned by the force of the fall in a determinate direction, would not be found under these circumstances beyond some local and more general currents caused by the irregular heating of the different strata of water; the motives which occasion the blows of the waves in still waters are external, as they are principally observed on the surface and gradually disappear with increase of depth. In consequence the depths, of the Ocean are protected against the influence of the waves, but the promontories on the contrary, are exposed to their attacks, and after some time must be progressively worn-away, depositing the products of the inundation as soon as in their gradual change, they reach the most distant and immobile strata of water: thus the depressions of the land are filled, and in time, if the quality of the sediments is uniform, an entire equality in the level of the bottom is formed.

In attributing these particularities to existing circumstances, we would have to look—from want of other positive bases—for the deep-places at the bottom of the supposed-sea of the Pampa, there, where, after the fall of water, and even under present circumstances the afore-said places are found in distant points, and we should also be compelled to discover in the rocks or over-topping Sierras, those points from whence new material constantly came to raise the level of the bottom of the sea, and from whence it was carried towards its destination.

But, inasmuch as in the fall of the eruptive granite-rocks a crumbling into fragments of equal size never took place, the great-

est moreover, weighing more in their totality than the smaller ones; and the first resisting in whole or in part, any transport to distant places; they were naturally deposited upon the level nearest to the Sierra, thus not only causing the porous and coarse quality of the inundated earth immediate to this locality, but also proportionately contributing to raise it.

In conformity with this, the sediments in the neighborhood of the Sierra present much more pronounced and complicated local differences, in the proportion in which they are deposited, than the strata of the Pampa in the coasts of the Paraná. A mutual mixture of the products of inundation, brought from different directions, must have reached its hight from motives which are visible, where said products must have made the longest distance, and simultaneously acquired the greatest firmness.

In the neighborhood of Córdoba, at a short distance, depositions of course land and large depositions of marly material, are frequently found one alongside the other. But the last are rarely found—at least in the middle and upper strata—without a certain spongy aspect, which more or less indicates the porous structure of the deposits of coarse feldspar, from which comes the marl.

A complete crumbling of the fragments of feldspar could only occur after long space of time, and after the filtration of the strata of water which covered them, the strata of earth being only exposed to the influence of the air and water after these events.

But the supposed phenomena of the crumbling which goes on even now, appear to be deduced from the aggregate of an efflorescence which appears upon the superior portions of one of the calcareous strata of the hill near the Astronomical Observatory of Córdoba. It gives the following composition: —

Sulphate of calcium.....	SO^2	$\left\{\begin{matrix}O\\O\end{matrix}\right\}$	Ca =	3.715
" " potassium.....	SO^2	$\left\{\begin{matrix}O\\O\end{matrix}\right\}$	Ka^3 =	32.342
" " sodium.....	SO^2	$\left\{\begin{matrix}O\\O\end{matrix}\right\}$	Na^2 =	53.136
Chlorid of sodium.....	Cl. Na.		=	10.807
				100.000

The want of determinable quantities of magnesia which is generally found in all the subterranean waters of these lands, does not support the supposition that this efflorescence is a residuum of the evaporation of those waters, raised by an intense capillarity. The existence of incas-stones crumbled by the action of the air might be first taken into consideration, from the abundance of the sulphates; because, after the investigations of Struve, and others, (*Comp.* Roth, *Beiträge zur Petrographie der plut. Gesteine*, S. 129), it cannot be doubted that an amount of chlorids and sulphates are peculiar to many eruptive granite rocks.

Putting aside the said reflections for the present, it only remains to mention some others in reference to the relation of the Pampa to the vegetable kingdom, so far as regards the proportion of its chemical composition.

Although in Agriculturial Chemistry it is known and declared long ago, that those classes of earth which directly owe their origin to the disintegration of primitive eruptive rocks—the same classes which in part compose the flourishing low-lands of the Rhine in Europe, and the celebrated ones of the Nile in Africa—are considered as the most favorable for cultivated plants (Mulder, *Chemie der Ackerkrume*, Bd. I, S. 575), a slight glance upon the composition of the soil of the Pampa, is sufficient to enable us to designate it respecting the inorganic nourishment of the plants, as very favorable, and almost inexhaustible.

As a proof of this assertion I will insert the composition of the Nile mud—or sediment—known since time immemorial for its fertility, according to the analysis of Johnson *(Pharmaceut. Centralbl.* 1852, S. 152) and compare it with an analysis of the soil of Villa Maria.

	In aggregate		Soluble		Insoluble	
	Nile-mud	Earth from Villa-Maria	Nile-mud	Earth from Villa-Maria	Nile-mud	Earth from Villa Maria
	%	%	%	%	%	%
Oxyd of potassium.....	1,26	2,852	1,26	0,611	—	2,241
„ of sodium.....	0,89	2,633	0,89	2,385	—	0,248
„ of calcium.....	5,43	3,568	3,89	1,490	1,54	2,678
„ of magnesium.....	2,73	1,954	2,26	1,641	0,47	0,313
Sesquoxyd of iron.....	13,19	4,741	11,22	3,911	1,97	0,830
„ of aluminum...	12,12	16,673	6,75	8,540	5,37	8,133
Silicic acid and sand.....	62,39	59,941	4,30	12,627	58,90	47,314
Phosphoric acid.....	not design.	0,517	—	0,160	—	0,367
Sulphuric „	0,22	Vestiges	0,22	Vestiges	—	—
Hydrochloric „	0,03	Vestiges	0,03	Vestiges	—	—

If, notwithstanding this, the so highly favored soil of the Pampa, only possesses an insignificant vegetation, the reason must be sought in the fact, that as yet it has not been able to produce a sufficiently thick stratum of *humus*: or rather there can be no doubt, that if some localities are not very fit for the cultivation of plants introduced from Europe—notwithstanding the analogy which exists between the chemical and mineralogical compositions of the soils from which they come, and to which they are destined—these irregularities are caused principally by the singular condition under which the soil of the Pampa is found.

There are two points of much consideration respecting the vegetation of the Pampa in these conditions, which it is the custom to

designate as "climatic" — 1. The extraordinary level — almost horizontal—of the greatest part of the Pampa which does not furnish to the liquids of the earth—full of soluble salts originated by disintegration and dissolution—a satisfactory drainage, even as also happens in analogous conditions of more limited extent in Europe and other parts of the globe. 2.—The want of abundant meteoric precipitations, without which an exhuberant vegetation cannot exist.

These circumstances which exert a mutual influence are amply sufficient to explain the character of the Pampean vegetation, because their prejudicial influence is constant.

The extraordinary quantity of salts dissolved in the liquids of the Pampa soils,—principally chlorids and sulphates of sodium and magnesia—which in some localities amounts to 10 per mill and more, is a constant, although indifferent, fact, whether we wish to consider these salts as in part a diminution of the salt contained in the former strata of waters which covered the plain of the Pampa, or as the exclusive product of the disaggregation of the fragments of rock which compose the Pampa soil.

Those parts of the soil appertaining to the districts of the Paraná, which we chose for our investigations between Córdoba and Rosario, and which present the most favorable conditions for drainage, are no exception to the rule, as appears from the abundance of salt in the rivers which cross them: from example the Saladillo which empties into the Paraná half a league from Rosario. From pre-historic times the waters of the Sierra of Córdoba, etc., run in four rivers towards the level ground of the S. Eastern Pampa, and only one of them—the Tercero—reaches the Paraná, carrying with it the salts dissolved during its normal course to the sea. The others run towards the depressions of the Pampa and thus daily enrich the soil with a new quantity of soluble salts: but being evaporated in greater part or partially absorbed about half-way, they seem to appear again by hydrostatic movements in some cavities of the Pampa—Lagune of the *Porongos*, and *Mar-Chiquita*—where they are concentrated by other evaporations, and thus convert their environs in time into salt-wastes.

It is easily understood from the compact and calcareous qualities of the terreous strata near the Paraná, which interpose as an impenetrable dike to the movement of the waters, that their hydrostatic movement cannot continue in the same degree to the level of the Paraná.

The concentration of the salts dissolved in the liquid of the soil, and which are principally composed of chlorids, carbonates and sulphates of sodium, potassium, calcium and magnesium, does not take place equally. The amount of the solutions of calcareous combinations is diminished in a certain degree when the sulphates

exist; on this account a limited diminution of sulphuric acid is also perceived; but on the contrary, during the process the chlorids of the earthy waters—principally sodium and magnesium,—increase without interruption.

Although these salts are considered as direct nourishment for plants when found in small quantities in the earthy waters, their favorable influence upon vegetation disappears, so soon as a certain concentration takes place in those waters.

Knop—one of the most distinguished agricultural chemists of our times—who made minute experiments upon the absorption of inorganic food by the roots of cultivated plants, arrived at the following results respecting the influence of the above-mentioned salts upon domestic European plants.

"The wild plant does not require chlorids as food. From 1861 I cultivated wheat, water-cress and lucerne, without adding any chlorid to their nourishment. With manures although weak in chlorid of sodium, disadvantageous effects for the most part were observed; and as demonstrated in the experiments upon the absorption of salts by plants, the chlorid of magnesium exercises a noxious effects upon the contents of the cells of their roots. It is possible that by heavily manuring with Na. Cl., large quantities of Mg Cl^2 are produced by the reciprocal effect of Na. Cl. and the combinations of magnesia which exist in the soil, and that the pernicious effect of Na. Cl results from this reaction." (Knop, *Lehrbuch der Agricult. Chemie*, 1868, S. 288).

"Even so the chlorids of sodium, potassium and magnesium, penetrate all the organs of the plants, and are found in the earthy liquids; and on this account some chlorid exists in all wild plants."

"If concentration be augmented, all the salts of potassium, ammoniacum and sodium, suffer an absorption greater in proportion in fine soil, and by these means disappear with the evaporation of the water from the liquids of the ground. Therefore, the concentration of the earthy liquids under natural circumstances principally consists in the increase of the magnesia, of the nitrates—in those classes of soil abundant in organic substances in a state of putrefaction—and of chlorids. The last are prejudicial to the plants, when found in some quantity." (Knop, *ut sup. O.* S. 822).

The same author says upon the absorption of the sulphates as follows:

"Every mineral salt—excepting the nitrates—on entering into the textures of the roots, encounters resistence as soon as its amount equals one per mill of the weight of the liquid; in general the sulphates meet with a tenacious opposition, which clearly result in concentration of 2.5-3 per mil." (Knop, *ut sup.* O. S. 828).

According to these experiments of Knop there can be no doubt, that in all those parts of the Pampa, where an accumulation of soluble salts in the liquids of the earth has occurred, an influence promptly appears upon the growth of cultivated plants, which explains their degeneration. Whether or not under these circumstances, the characteristic vegetation of the Pampa has been formed in such wise, that the activity of the roots may be less injured by the salt in the liquids, can only be positively resolved by experiments of vegetation with those solutions. Fortunately those lands are limited to certain localities, where, on account of the movement of the waters of the earth, this class of irregular characters reign, and in almost all parts of the Pampa where natural or artificial resources of water are sufficient to guard against the unfavorable effects of drought, *i.e.* in the districts of the rivers Primero, Segundo, Cuarto, etc. etc., the lands produce satisfactory harvests, thus justifying the hopes founded on their composition, which is in view of Agricultural Chemistry, so favorable.

CHAPTER X.

MINERAL RESOURCES OF THE ARGENTINE REPUBLIC.*

I. Metalliferous Deposits.

The mountains of the Argentine Republic, and above all those of the Provinces of Córdoba, San Luis, Mendoza, San Juan, Rioja, and Catamarca, contain great wealth in metals, and long since produced a lively mining industry by the search for gold, silver, copper, lead, and nickel. However, this occupation has not yet become of that importance which in reality belongs to the richness of the metalliferous ores; but it will certainly gain much more as soon as the railways now in construction are finished, so that by the increase of immigration the necessary workmen can be procured, and transport be rendered easier and more secure.

The metals we mention are found in real veins, and the gold is also found in placers. The rock in which the veins appear differs much in the different mining districts, *i.e.*, in the "high lands of Capillitas" it is granite; in the "Sierra of Córdoba" and of "the Huerta," it is gneiss; in the chain of Famatina (Rioja), it is schist; near Gualilan (San Juan), it is paleozoic limestone, trachytic tufa, sandstone, etc. We also find that its occurrence is very varied. So much the more interesting is the fact already mentioned in Chap. VI., on the Geology of the Argentine Republic, that, notwithstanding the great variety of the rock in which the veins appear, the greater part of, or perhaps all, the metalliferous veins in this country are only found in those places where the granitic gneiss, limestone, etc., are penetrated by igneous rocks, such as trachyte and andesite belonging to the tertiary epoch.

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* By Prof. A. Stelzner, Sc. Dr.

This circumstance, so characteristic of Argentine metalliferous veins, demonstrates that their birth took place in the tertiary period, and was occasioned by volcanic action at that time. For the rest, in the neighborhood of a trachytic penetration, a single vein is rarely found, but on the contrary, several veins are ordinarily found in the same district.

I will now follow these general remarks by an enumeration of the principal mining districts of the country.

The gang of the auriferous veins is quartz or horn-stone, impregnated with native-gold, pyrites, and brown iron-ore. It is found in this form in the Province of San Luis, at the environs of *Tomalasta*, above all in the *Cañada-Honda*, and at the *Portezuelo* of the Sierra of *Ullapé*, as also, in the heretofore celebrated mines of *Gualilán* and *Guachi*—San Juan.

Gold placers are found in the Sierra of *Famatina*, Rioja, in the valley of *Calchaquí*, Salta, and in the Department of *Puna*, Jujuy. In the two last the explotation is made in a most primitive manner by the Indian population; those of the Province of San Luis are a little more advanced.

Silver.—The richest silver district of all the Republic is the *Cerro-Negro*, near Chilesito, Rioja; a surprising quantity of veins are found here in the schist, which, besides brown-spar, blende, and pyrites, contain native-silver, ruby-silver, horn-silver, and argentite, sometimes in such abundance that it may rival the richest districts we are acquainted with.

Unfortunately, all the mining industry of this district is at present in the hands of the small traders—almost every inhabitant of Chilesito has his little mines—who have neither *the* necessary intelligence nor the indispensable capital, to enable them to work with energy. When, however, in the future a good mine shall be constructed under proper direction, the village of Chilesito will be one of the most important mining districts of the Republic, notwithstanding its altitude of from 3,500 to 4,000 metres.

In the Sierra of Córdoba, quartz-veins are also found rich in horn and native-silver, in which, as a mineralogical rarity, a little iodic-silver is found. The explotation, which is almost totally inactive in this district at present, could be greatly developed.

Argentiferous Galena.—Veins whose chief ore is argentiferous galena, are very numerous in all the mountains of the Republic, and soon these districts will begin to prosper on the construction of the railways already begun. At present, the greater part of them are exclusively occupied in the extraction of silver, because the lead is not worth the long transport on mule-back. It therefore gives no value to the distant mines, notwithstanding its abundance. The principal districts which possess veins of argentiferous galena are those of *Paramillo de Uspallata*, Mendoza;

in the Sierra of *Fontal de Castaño*, in the Sierra of *Huerta*, San Juan, and in the Sierra of Córdoba, above all in the district of *Ojo de Agua*. In all these places a quantity of veins are found, which are not worked, save superficially from time to time, on account of want of capital. Tunnels, machines for the raising of ores and water, machines for the separation and washing of the ores, as yet are completely unknown to the greatest part of these mines, nor have they been dug to any great depth. These remarks are sufficient to prove that these mines will become developed as soon as the expense of freight has diminished.

Nickel-ores.—At Jagué, in the Province of Rioja, veins are found of which the principal substance is massive nickolite, and which have been exploited with much profit for some 20 years past. Unfortunately the political disorders during the present year (1874-5) forced the European proprietors to abandon their business.

Copper-ores.—Native copper, chalcocite, bornite, tetra-hedrite, emargite, and chalco-pyrites, are found in thick and rich veins, and generally their value is considerably increased by a small alloy of gold and silver. The most important district is that of the Sierra of *Capillitas*, Catamarca, in which great mines are worked in an excellent manner. Its ores are auriferous chalco-pyrites, tetra-hydrites, and bornites. The district of *Mexicana* is situated alongside, at the inhospitable hight of 4,000 metres, but rich in veins of enargite. In the Sierra of *Famatina*, Rioja, there is also a district of great promise for the future. The mines of copper-pyrites situated in the *Southern Sierra of Córdoba*, are of less importance, but quite remarkable; they are at present abandoned. The same may be said of those in the valley of *Calchaci*, in the Department of Rosario on the Frontiers, Salta. The old heaps of refuse in the latter localities lead to the belief in a large distribution of the veins of copper-pyrites and grey copper. Finally, I here mention the well-known fact that the *Mountain of Rayen*, in the South of the Province of Mendoza, is characterized by an extraordinary richness in native copper. Unfortunately this country is still within the Indian territory, so that at present, notwithstanding its wealth, an explotation is not possible.

Iron-ores.—It is often pretended that certain mountains contain a great abundance of iron-ores, and although it may be probable, we have as yet no exact data on the subject.

We insert here the passing remark, that according to a calculation of Major Ignatius Richard made in 1869, when 2687 men were occupied in the mining industry of the Argentine Republic, with a capital of about $1\frac{1}{2}$ million of hard dollars placed in mines, they produced in 1868, the amount of 105 kilograms of gold, 1,200 kilograms of silver, 13,829 quintals of copper, and 20,000 quintals of lead.

Inasmuch as more exact statistics are wanting, I reproduce these figures without guaranteeing them.

II. The Coal-Measures.

The problem whether there are coal-measures worth working in the Argentine Republic, has been already studied several times, and yet awaits a final resolution. As it is superfluous to demonstrate the great value of fossil-coal—should it exist here—to Argentine industry, I will simply communicate all we as yet know about it.

Commencing with the general result of all my researches, I say at once, that coal-measures exist here, but it is a question whether they are worth exploiting. It is already mentioned in Chap. VI that the greater part of the mountainous ranges of the Pampa which consist of gneiss and crystalline schists, are surrounded by sandstone, and we endeavored to demonstrate that this sandstone formation, under the cover of the clay of the Pampa, probably fills all the basins which exist between the different mountains. Thus we showed that this sandstone appertains to formations of different character, and consequently a generalization of the following remarks is not admissible. On the contrary, they will be especially dedicated to the basin, more or less ten leagues broad, which is found in the Province of San Juan between the *Sierra de la Huerta* and *Pie-palo*, divided by the river *Bermejo*. On the Eastern edge of this basin, that is to say, on the S. W. slope of the *ierra de la Huerta* in the district where the *Papagayos* takes it source, several places are found of out-crops of coal-beds over an extent of some 25 square leagues. On the slopes of the source of the *Papagayos*, half a league from the *Sierra de la Huerta*, and two leagues from the post-house situated more to the South, red sand-stones are found with imbedded layers of conglomerates, whose pebbles are exclusively of gneiss, mica-schist and quartz. A course grained sand-stone is found underneath and in this last a bed of from 0.9 to 1.2 m. thick, vertical to the horrizon, and consisting of an alternation of coal and shale, in such a manner that this peat or coal forms almost half of the entire thickness. By means of a shaft of small depth, I found at 5 metres under the surface a second bed not so thick. The mica-schist which alternates with the coal is extraordinarily rich in fossil plants, and these last as I have already said, cause this formation to be recognized as corresponding to the carboniferous system which European geologists indicate by the name of "Rhetic." Also on the opposite—or Western—side of the basin, that is to say on the Eastern slopes of the *Sierra del Jachal* and of *Huaco*, a thin bed of coals is found in the same

sand-stone formation; but here the strata are much disturbed, so that the beds show a dip of several degrees, consisting of repeated alternations of pitch-coal and sandy shales. All these outcrops of coal have no great technical value as yet, nevertheless, they are of great importance because they lead us to suppose that all this basin, 10 leagues broad between the above-named mountains, is probably filled up by a carboniferous formation of which only the superficial strata are now known. Moreover, the thickness of these strata in the center of the basin, is entirely unknown; but when it is remembered that the beds of coal are generally thicker and of better quality in the center of the basins than at their borders—a fully proved fact in the carboniferous districts of almost all countries—it is reasonable to suppose that here we have an analogous case. However this may be, the observed facts demand that borings should be instantly undertaken in the middle of the basin, which should penetrate down to the old crystalline schists. Such an enterprise would demonstrate whether the beds of coal increase in the center, and whether—as it may be hoped—they are of sufficient thickness to justify working them.

As the basin between the two mountains is a desert almost deprived of water and covered only with a miserable thicket,—for the River *Bermejo* which divides it is for the greatest part of the year only a river *seco*—dry—great difficulties would have to be conquered in making the borings, as well as in a possible future exploration: yet with enough energy and capital, success might be rendered certain. The borings for coal would be at the same time borings for water, and thus also contribute to the final solution of the most important problem for the deserts of the Interior; viz., "whether the construction of artesian wells is possible here."

As for the district in question a favorable solution may be predicted in a geological point of view, because the waters of the *Bermejo* which enter the valley, are lost under the surface where they meet an impermeable stratum in the shales of the coal-measures. Consequently a great subterranean reservoir of water ought to exist above this schist, and by virtue of the geological structure of the whole country these circumstances promise that openings made in the center of the basin, would also give a passage to the subterranean waters. On account of the large transport of cattle across this district, bound to the provinces of Cuyo and Chile, were the waters of an artesian well—instead of coal—to be found, the expenses of construction would be well remunerated.

No other districts where coal or lignite could probably be found, are known at present; meantime in the provinces of the Republic some bituminous shales have been found, the study of which may give results of great importonce in the future. These shales exist in the province of Mendoza, in a series of banks of sand-

stone and conglomerate spread over a great extent of the slope of the *Sierra de Mendoza*, and are also found strongly developed in the inhospitable country of the *Paramillo de Uspallata*. A very bituminous schist, in which I have found some vegetable remains, a quantity of shells of a small species of *Esteria*, and sometimes also, scales of fishes, has been found in the sandstone near *Challas*, in the *Cerro de Cachenta*—some 70 leagnes South of Mendoza, on the road to *Planchon*, and finally also, at a depth of several meters in the environs of *Uspallata*. This bituminous schist in several places gives birth to springs of naptha, which have formed these depositions of asphaltum. They are known at the *Cerro de Cachenta*, and above all—in abundance—on the road to the *Planchon*. A more or less detailed study of these two localities has not yet been undertaken.

A similar formation appears to exist in a great part of the province of Salta. All the intelligence we have received from thence ín reference to its geological formation, mentions numerous springs of naptha or petroleum, generally arising from these strata. It is said that, above all, the district of the *Tar lagune of St. Michael*, to the West of the *Sierra de Santa Barbara*, is rich in these springs. We must wait for further information, at the same time wishing that these springs may soon become the object of a lucrative explotation.

CHAPTER XI.

THE NEVADO OF FAMATINA AND ITS MINING DISTRICTS.*

PARALLEL to the Cordillera of the Andes from near the 25° to the 30° of S. lat., a valley of oval form spreads out at the foot of the *Nevado of Famatina*, the principal peak of a chain of mountains which rise above the limits of eternal snow.

The mines of gold, of silver and of copper, which for a long time have had a certain celebrity under the name of *Minerales de Famatina*, are found upon the slopes of these rock-ridges. It is to be believed, however, that their richness is not entirely known as yet, and new discoveries may be relied on as soon as railways and immigration shall have rendered easier and less costly the labor of explotation. Mines of great opulence have already been discovered over an extension of some fifty leagues, in which, without mentioning tin and bismuth, a great number of valuable metals have been found. The strata in which the ore is found are composed of crystalline schist and graywacke in all their modifications, together with quartz and gneiss, and they are intersected in the mines which we at present know, by other strata often very thick, composed of porphyry.

If the ensemble is composed of granite and trachyte, the principal summit of the mountain is formed of sedimentary layers which—above all on the East—present a considerable displacement, and extend even to the eternal snow. In the centre of the red sedimentary lands, the snowy summit of Famatina rises in all its majesty, with its brilliant white sharply defined upon the blue-sky, like an isle upon the ocean.

The principal mass of these layers is formed of red and white sandstone and of black clay, which have served to name almost

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* By Mr. Emile Hünicken.

all the vallies, mountains, and rivers of this region, in which at every step we meet the *black river*, the *black mountain*, the *red* or *white valley*, etc.

The Eastern slope of the *Sierra de Famatina* is the richest in metals, and possesses more water-courses than the Western slope. Several rivers of different breadths are precipitated from the summit with extraordinary rapidity, on their way excavating capricious meandres, caverns and porticoes, in the soft clay, until—ceasing their furious course—they bathe the lands situated at the foot of the mountains. There, man has constructed flourishing villages and cities, where he utilizes their waters for irrigating his vineyards and his gardens planted with fig and orange-trees, under which he finds a shelter from the burning sun of Rioja.

Six rivers rise in the central part of the mountain of *Nevado*, which water two cities and fifteen villages whose development is exclusively due to the explotation of the mines; before their discovery this valley only contained a few Indian lodges—Sp. *tolderias*—whose sparse population hardly amounted to a tenth of the actual inhabitants.

No historical information exists about the discovery of these mines, and such as tradition has left smacks so much of fable, that no one could distinguish the limits which separate truth from falsehood.

Mexican miners—either learned or amateurs—discovered the first mines of gold in the district called *Mexicana*. Without doubt the first fact which fixed their attention, was the great quantity of iron existing in the waters of the River *Famatina*. They have a very marked color of ochre, which they supposed originated at a considerable deposit situated in the ancient bed of a lake in the mountain.

Farther on they found gold, and established the small buddle known under the name of *Cuevas*, where even now the business of gold-searching is carried on, and daily produces from 4 to 16 grammes per head. This result is a favorable one, considering the imperfection of the machines.

These Mexicans ascended the river in search of the bed which contains this golden-sand, and they found it in the highest regions of the mountain immediately under the snow. They named this mountain the *Cerro Mexicano*, and established there the business of mining which still continues, and which, during its existence, has had some very productive periods. Since then, the other mining districts of this chain of mountains were successively discovered; at present they have an extension of some 20 square leagues.

The mines of the *Cerro de Famatina* have caused many explorations, the souvenirs of which have been preserved under the

form of legends. Isolated in their huts situated close to the eternal-snow, and constantly assailed by the tempests,, the miners gathered around the evening fire, related the voyages and discoveries of the Aragonese—fantastic personages—who were the heroes of improbable adventures always connected with the rich silver mines of the *Cerro-Negro* and *Caldera.* Notwithstanding their great exaggerations, these narratives seem to indicate that at least a great deal remains to be discovered in a region as yet so little known.

The war of Independence, and the civil wars which succeeded it, at first prevented all increase of mining industry, although the plant necessary to its development relatively cost a small sum at at the time of the discovery. It was only in the year 1824, when tranquillity had returned, that a large company was formed in Buenos-Aires, under the name of *Famatina Mines,* with a capital of one million dollars.

The Directors of this Society were Messrs. Henry James Brooke, E. Sir Alexander Crichton, Thomas Kinder, Jr., J. B. Robertson, Lieut.-Col. Rowan, Robert P. Staples, and Lieut.-Col. Wilson, The Principal commercial houses took an interest in the enterprise, and German miners were engaged.

This company executed important works which merit our admiration even to-day; but its development was arrested by civil war. General Facundo Quiroga—surnamed the tiger of the plains—caused the learned manager of the Company, Carl Pfoertner von der Hoellen, of Berlin, to be killed, in order to seize its property. The death of the manager caused the dispersion of the workmen and the ruin of an enterprise, in which such an important capital had already been employed.

Since that time, several veins in Famatina have been worked, and some proprietors have received considerable results. But the dawn of mining industry was always arrested by civil discord, and it was finally completely abandoned. However, a new period commenced for this business during the Presidency of Mr. Sarmiento, in which it has become systematized, and is continued under serious and well-studied plans.

The mining districts of *Nevado de Famatina* have no fixed limits, and cannot be considered in their ensemble. However, I have adopted the division by departments, so as to render their description more distinct; and I will add some information about some of the operations of the miners in their foundries and laboratories of amalgamation.

As we have already said, all the mines are found on the Eastern and south-eastern slopes of *Nevado,* which has two summits—the properly-called *Nevado,* and the *Negro-overo.* The last is found a little more to the North, and is some hundreds of metres higher than the other.

In this latitude the limit of eternal snow ought to be at 4,500 metres; but it is not so here. Permanent snow in reality is only found at the hight of 5,800 metres. The isolated position of this dicephalous giant, and the formidable tempests which ceaselessly burst around it, sufficiently explain the phenomenon.

It is believed here—as elsewhere—that the richest veins of silver are to be found in the inaccessible regions covered with snow, where too credulous men have gone to search for them; but we believe that not a single vein has ever been discovered above the altitude of 5,000 metres.

It is in *Nevado* that the greatest of all the mines of the country has been found—the *an Tomás del Espino*—which has been worked for several years.

The metallic belt of the mountain on the South East has a vertical hight of 2000 metres, and commences at 3000 metres above the level of the sea. This surface of some 15 square leagues is divided into square districts—or mining lots—thus named:—

1. Mexicana, San Pedro de Espina.
2. Ampallado.
3. Bayos.
4. Tigre.
5. Caldera.
6. Cerro-Negro.
7. Morado.

I. The Mexicana, San Pedro de Espina.

This mine is the most elevated, being situated between 4 and 5000 metres above the sea. It is not only the most important and the richest, but per contra it is that which, by its position at an excessive hight, offers the greatest obstacles to its explotation. The miner who lives in a badly-lighted little-hut above the clouds, passes a life of privations and misery complicated by dangers without number. Around and above him all verdure has disappeared. He can only perceive three colors: at his feet, the clouds resemble a whitish-grey mist, a hazy Ocean from whence emerge the peaks of the mountains; before him, the white plains of the eternal-snow, and above him an invariably pure sky of a deep blue color. The only animals—save the dog—which have followed man to these stormy regions, are a bird and a small rat both of greÆish color.

In the shade the thermometer always remains below zero in these habitations, which are probably the most elevated on the earth, because they surpass by more than a thousand feet the gold regions of Thibet and the Himalaya. Water is procured by melting ice over fires which are kept up night and day, and the co-

mestibles are preserved for several years. Meat can only be cut by means of the axe or the saw: it loses its taste in this continually frozen state, and I myself have been able to verify that an almost petrified piece of beef found in a mine abandoned for a year previous, and which I had caused to be cooked—it could not be wasted—had completely lost its taste.

Although the extremely rarified air regularly causes head-aches and other indispositions to novices, the lungs soon become accustomed to it, and it produces a greater activity. The movements of the body at this hight, however cautious they may be, occasion a palpitation of the pulse and a very great agitation of the respiratory organs. It is dolorous to hear the sighs and groans of the *Apines* or porters, who come from the depths of the mines to discharge their sacks filled with from 50 to 80 kilograms of ore. This labor appears to be beyond the power of human energy, and yet I know some miners who have thus labored eight or ten months per annum, for thirty or forty years.

Almost all the mines of this district are found on the cragged declivity of a very narrow ridge, which extends directly from the *Nevado* in an easterly direction for the distance of 4 kilometers, at the elevation of some 800 metres above the bottom of the two valleys.

The veins are indicated by slate and blue gravelly clay, but the ore is entirely broken up by the alternation of freezing and thawing during so many centuries, so that, all the mountain is enveloped by a coat of more than 12 metres thick of detached stones with acute angular edges and a yellowish-grey color, whilst the hard rock is only found on the narrowest ridges.

All the veins at present discovered at this point, prove to be divided into two systems which differ considerably one from the other, not only in the direction of the veins, but also in their mineralogical properties and their antiquity.

The veins of the first system run from West to East, and contain silver above all, whilst those of the second follow a direction from South to North, and principally hold copper. The quantity of gold is generally the same in both.

All those that contain silver, among which is the *Mexicana Verdiona*, are of identical character.

The entrance is always formed of a porous quartz similar to pummice-stone, and of a detached sulphurous gravel more or less corroded; these two substances often contain a little sulphurous silver in thin spangles. Inasmuch, as all these veins are covered by thick layers of stones brought together by congelation, there is no guide for the researches except the indication of the porous quartz, which shows itself among the reddish-brown schists; thus, wherever this combination presents itself, a vein of silver will surely be found.

A little underneath the zone of this deep gang is generally found the pure silver ore, which is called here *metales cálidos.* These strata are again composed of quartz and more frequent and more sulphurous gravel, intermixed sometimes with sulphurous silver and native gold.

In all the mines actually in working, no trace of these ores is found. Long years have been dedicated to the search for these treasures, but more have been destroyed than discovered. Even to-day, in some of the families of poorer proprietors, morsels of gold of a rare beauty can be seen, which they show as a souvenir of the wealth of a time when, according to the legend, the gold of Famatina was weighed by *arrobas – Angl.* a quarter of a quintal each *arroba.*

At a depth of from 20 to 40 metres the ore mentioned above, diminishes; the vein loses its porosity, becomes harder, and only holds copper. The sulphurous gravel is then entirely compact, loses more and more the gold, and the *metal cálido* changes into *metal frio,* which is at present the only object in the working of these mines.

The regular value of these ores is:

For the copper,	15 to 18 %	per quintal.
„ silver,	0.3 to 0.5 marks.	
„ gold,	0.03 to 0.05 ounce.	

These ores are smelted in one forge established at the foot of the mountain.

The mine of *Upulungos* also produces a copper-ore under the form of verdigris.

Inasmuch as no mine here has been dug deeper than 50 perpendicular metres, the zone of metal has not been perforated more than about 15 metres. We cannot therefore, give any positive details beyond this depth, at which the metal remains *constant.*

The names of the principal mines under work are, *Mexicana, Espino, Verdiona, Upulungos,* and *Compañia.* It appears that formerly they were very rich; but to-day they only produce ores of the values given above. These ores are found, however, in a sufficient quantity, and the breadth of the veins is from 1 to 7 feet.

Although the mean product does not generally surpass the proportions already mentioned, native gold as yet is not wanting, and the amount of silver in the small veins—which may be considered as the branches of the principal ores—sometimes rises to 10 and even 12 marks per quintal.

At present four companies—one or two of them recently established—endeavor by the use of sufficient capital to conquer the obstacles presented by the ground and the rigors of the climate,

for the purpose of exploring the riches of this mine, the most elevated on our globe.

Unfortunately, beginners in general have neither the elements nor the necessary perseverance; thus they often stop after having uselessly disbursed insufficient sums.

Roads, and good roads, or rather railways, are indispensable here, the same as in all mining districts elsewhere; and so long as these are wanting; just so long as the transport from the mines to the foot of the mountain, and *vice-versa*, be made on mule-back, it is useless to count either on the development of this industry, or on a serious explotation.

For a distance of 4 leagues the Famatina river is the only road which serves for three or four districts, notwithstanding its bed is very rocky, and in winter it is useless on account of the floating ice.

The timber employed to shore-up the mines is transported to the *Mexicana* with great difficulty, although the shoring-up is particularly indispensable at the mouths of these mines which are dug in a layer of stones which had been frozen for centuries. This layer is often six metres thick, and the difficulty may be conceived of laboring in these conglomerates—named *teltel* by the miners—of recent formation.

When the ice is perforated, a few days of summer melts it, and renders the shoring by timber absolutely indispensable, to prevent the falling-in of the mouth.

The ores discovered are not only those of sulphurous combinations; copper is found also in combination with arsenic and antimony. These latter ores, which are black or of a brownish-red color, were improperly valued for a long time. They were taken for nickel by some Frenchmen who visited these mines some 10 years ago; and even now, some people believe in the richness of the rocks of *Famatina*, in nickel and cobalt.

Professor Stelzner was the first to give us a satisfactory explanation on this subject. The black species are of *Enarhite*, and the reddish-brown compose a new ore which Dr. Stelzner—who left the Argentine Republic as soon as he was appointed to the Mining Academy of Freiberg—has introduced to the scientific world under the name of *Famatinit*. Thanks to a mineralogical description which this *savant* has sent me from Freiberg, I can communicate the two following analyses of the *Famatinit*, made by Professor Siewert, formerly of the University of Córdoba:

	I.	II.
Sulphur	29.07	29.28
Antimony	21.78	20.68
Arsenic	4.09	4.05
Copper	43.64	44.59
Iron	0.83	0.81
Zinc	0.59	0.59

From these analyses Dr. Stelzner gives the following fórmula to the *Famatinit:*

$$4\ (3Cu^2\ S.\ Sb^2\ S^5) + (3Cu^2\ S.\ As^2\ S^5).$$

Its constitution would be:

Sulphur	29.71
Antimony	22.65
Arsenic.....	3.50
Copper.....	44.14

Thus it appears that this ore—like the pure sulphurous copper—contains neither gold nor silver; in effect these two last metals come from the quartz and the sulphurous gravel, which is always found in these ores under the form of small veins. We expect that these perfect metals at greater depths will not be replaced by copper-ores.

The constant and regular appearance, as well as the constant enlargement, of these veins as the mine deepens, authorizes the prediction that a brilliant future awaits these districts, when local and meteorological difficulties shall have been surmounted by the practical applications of science. As soon as steam penetrates to them, the metalliferous industry of *Famatina* will again see those fortunate times when the gold was weighed in large balances; but the proprietors of the *Mexicana*—always the most favored—will never see the realization of their golden dreams, or the fantastic predictions which ignorant charlatans have bequeathed to them.

The veins of the second system—probably the most recent—all run from North to South. They cut the mountains from valley to valley, and cross, and lose each other towards the East in unexplored regions.

This district is called *San Pedro*, from the name of its principal mine which—with the exception of a small part—belongs to F. Galvan & Co.

Mining industry is a little more advanced in this district than in the others, and the *San Pedro d'Alcantara* has the only capstan as yet employed in these regions.

All the veins are found upon the escarpments and the layer of *Teltel* is not as thick as elsewhere. For the most part they contain the porous quartz and the sulphurous gravel, as in the zone of the *metales cálidos*, but silver ore is totally wanting. They may be classed among the copper veins holding more or less gold.

Inasmuch as the enargite is the predominant ore here, Professor Stelzner has given to the whole group the name of *Enargite veins of the Famatinate*, and has also published their scientific description.

The enargite is always accompanied by famatinit in which is also mixed the copper gravel, mother ore of verdigris, sulphurous gravel, copper-galena, verdigris, and also from time to time, pieces of largely-leaved lead-galena. We ought to mention as recent productions the copper and martial vitriol which is brought from the upper parts of the *San Pedro d'Alcantara* mine, as well as quantities of native sulphur almost always pure enough to enable the walls of the mine to be inflamed.

According to Prof. Stelzner, the sulphurous gravel has produced this sulphur.

The mines of *San Pedro* which have a length of 600' and a breadth of 300' with four parallel and 2 transversal veins, enclose pure enargite at a crossing of 4'. According to the analysis of Prof. Siewert this ore contains:—

Sulphur	30.48
Arsenic	17.16
Antimony	1.97
Copper	47.83
Iron	1.31
Zinc	0.32
Lead	0.73

The mines of *San Pedro* and *Coquimbana*, are very probably the richest of this group: they are 45 meters in vertical depth and the yield of copper considerably increases as the mine deepens, at the bottom of which the ore gives some 50 % of copper in 1^{m} 25 breadth of vein: the working sometimes gives enargite, and blocks of copper-galena of the greatest purity a quintal in weight.

San Pedro has only been worked during the two past years, and it already produces some 3000 quintals of good ore per month, which the proprietors send to the foundery of *Escalera*, where it is transformed into bar-copper.

It could be easily imagined that the company must receive good dividends, in view of such an extraordinary amount of rich ore; but it is not so.

The difficulties inherent to the explotation, such as the excessive freights of the materials and of the bars of pure copper, the want of laborers and employés, the high price of all articles of consumption, the indifference of the Government, etc., are so many obstacles to the regular development of our mines and of our foundries, and often sufficient to smother this industry at its birth.

Steam will soon change the conditions of explotation, and in a short time it will be proper to appeal to those possessing special capacities in this business, because then a legitimate renumeration can be offered to them.

I ought to mention here a mine very badly situated, which was

opened some 25 years ago by a company of share-holders. This enterprise was undertaken under the most deplorable conditions; thus in 1855, the share-holders, after having pushed their efforts without success to the depth of 150 metres, abandoned all further attempts.

On ascending the valley an excellent new mine is met, which is very well conducted by the company *Esperanzas.* Its length is already 100 metres, and it appears that one of the eleven veins at present in working, produces one ounce of gold per quintal

Another is worked in the same direction by the *Valdez and Laharona* company, and a third is about to be opened in the region of *Espino* at a hight of 4500 metres, by Messrs. Almoniaco and Parchappe.

In fine, in the same part of the mountain the *San Francisco del Espino* mine is found, which had a horizontal depth of 20 metres some twenty years ago, and produced in three months some 30,000 dollars. It was sold for 24,000 dollars, but unfortunately the new proprietor soon saw it fall in under the first avalanche, and the works have not been renewed since then.

II. The Ampallado.

Several kilometres to the East of the *Mexicana* and *San Pedro* mines a plateau is met some 25 leagues square, where the mines of *Ampallado* are found, and the superficial veins running through the argillaceous layer cross each other in all directions. These veins contain silver, and sometimes yield an ore which gives from 10 to 12 marks per quintal. Their composition is generally uniform: all principally consist of a blueish quartz—sometimes yellow, and often very much broken. It is this quartz united by a white and gravelly clay, which makes the veins. The vein is, however, sometimes formed of pure-quartz so porous and tender, that it can be worked without the aid of powder.

In the *Blanca* mine which I visited a short time ago, at the depth of 25 metres, the quartz is easily raised by a wedge and beatle. The silver is principally found in these veins under the form of chlorure; but on examining the mines in working, and which do not exceed 40 metres in depth, it is quickly perceived that the ore is modified and presents modifications of silver with sulphur and antimony. These combinations disseminated amidst the quartz bear the name of *Polvorillo.* They certainly proceed from a corroded, decomposed silver-galena, and a brittle ore. The sulphur and antimony immediately show themselves under the blow-pipe.

At the hight of 4600 metres above the sea this district is almost inaccessible; the violence of the storms in such, that without the

greatest precautions all labor would be impossible. It is necessary to attribute the decadence of this explotation to material obstacles, as well as to the avidity and rapacity of the managers. The situation of this mine is even worse than that of the *Mexicana*, and it is more dangerous because the veins and rocks which compose it, are very much softer.

The *Ampallado*, although an almost forgotten district, and although the value of its ores is not more than $\frac{3}{4}$ mark per quintal, is still very important, and in the future may give very weighty results. The Comstock ores do not give more than from 1 to $1\frac{1}{2}$ marks, and yet the mines are valued at hundreds of millions.

III - IV. The Bayos and the Tigre.

A little to the South of *Nevado* a second equally narrow crest is seen, and forms at a short distance an isolated mount, whose light brownish-red has given it the name of *Bayo*, and which, it appears, was heretofore of great mineral richness. Owners of amalgamation laboratories have latterly discovered among the ruins, ore of the value of three ounces of silver per quintal, which was easily amalgamated.

Farther to the South-east the mines of the *Tigre* are met with. They were not long since in a deplorable state; but, inasmuch as they are of great richness, notwithstanding the innumerable difficulties, during the last years the working of the mines of *Socorro*, *Santa Bárbara*, *Jemelas*, *Colon*, *Chilenita*, *Hermosa*, *Chilena*, etc. has been recommenced.

The oldest mine is the *Socorro del Tigre*; it was discovered and worked by the Aragonese. The others more recent, attained the maximum of their development in three years, thanks to the richness of their veins. With the exception of the *Socorro*, which is obstructed, but which is supposed to be very deep, no mine here is more than 20 metres in vertical profundity. The direction of the veins is from South-east to North-west. The layers are formed of a bluish-black schist, of which the stratifications are upon the Western slope descending to the Southward.

The ore of the veins is found partly in quartz, spar of iron or of manganese, and sometimes in argil of iron, or argillaceous or quartzose manganese. The silver ores are very varied; I have seen the native-silver, the chlorure and bromure of silver, brittle-galena, and bronzed copper-ore, extracted from these mines. This district is upon a very steep escarpment, at a difference of more than 1.000 metres between the summit and the base. Therefore J would be very easy to make a shaft—called by the Germans Tiefban—that, with a good starting point and direction, would

probably cut within the extension of 400 metres, all the veins known up to the present, which are found at a considerable depth.

This idea would certainly have been already realized, could these regions be reached without loss of life. The transport of timber, provisions, and workmen by caravans of mules, it may be said, is almost impossible, unless minute explorations should produce better knowledge than we now possess. The only existing road which I have several times taken, runs along the summit, and in some places has no greater width than six inches; one is seized with vertigo on seeing an abyss from 1 to 2,000 feet deep opened at your feet.

A proper road would give new life to this interesting mine, and furnish transportation to all the wealth which would then soon be produced.

To the South-west, and in front of the other side of this deep and narrow valley, the inaccessible rocks of the *Cerro Morado* are found, so named from their reddish color. Veins of native copper and of red copper-ore crop out here, but they are not deep, and their working would not be advantageous, although sometimes pieces of pure-copper from 30 to 40 pounds' weight have been found. More to the South, the gravelly schist takes the place of the graywacke, and several veins of ferruginous mica containing gold cross each other upon the precipitous banks of the river. The smallest quantity at present produced is about 0.04 to 0.05 ounce of gold per quintal. The ruins of the laboratory of amalgamation where formerly only the ores of this mine were worked, are still seen at the bottom of the valley.

This district was almost forgotten, and only cited as an example of the extraordinarily dangerous roads; but recently man has retaken possession. An Englishman is working ores there, which give 0.15 ounce of gold per quintal. These veins are quite soft, and magnificent waters wash the foot of the mountain, so that the expense of working and transport will not be very great as soon as good roads be made. The success of this energetic explorer may be considered secure, as it is already a long time since he gave a new impulse to this industry.

V - VI. Caldera and Cerro-Negro.

The most important districts of *Famatina* are the extensions of the *Cerro-Bayo*; one is the *Cerro-Negro* to the South, and the other that of *Caldera*, to the East.

The mines of Caldera are found on the sharp declivities of a canyon in the form of a boiler—Sp. *caldera*—made in a mountain of graywacke and of gravelly schist, the summit of which reaches the hight of 18,000 feet. For several years already, numerous

veins of silver—and which have generally given great quantities of this precious metal—have been worked over a relatively small surface; it is supposed that the famous wealth of the Aragonese came from these mines.

These lucky pioneers of the mining industry of *Famatina*, without much labor in reality, could work the entrances of these mines, which, like those of Chile, are very rich in chlorure of silver ores. But the explotation was only superficial, and it would be folly to attempt to renew the working of the mines of these famous Aragonese, now become legendary.

The direction of the greatest part of the veins is from East to West; nevertheless cross-veins are not wanting; thus it is found that in the *Cerro-Negro*, the veins are found exactly at the points of intersection.

In different sites the veins form a real net-work, and I have been able personally to verify, on the occasion of the apprizement of the mine *San Pedro del Alto* belonging to Mr. C. Angel, that in an extent of 200×100 metres, 17 veins crossed each other in all directions, thus resembling a vast spiders' web.

Among the mines which sometimes have given surprising resources we can yet cite the *Aragonesa*—now very deep and very rich—the *Sentazon*, *Andacollo*, *San Vicente*, *Blanca* and *Marquez*.

The chlorure and the galena of silver are the ores most frequently found in them, but even more often the native-silver is met with, generally in fantastic forms such as branches, etc. I had in my possession for a long time a branch of native-silver of the weight of $7\frac{1}{2}$ ounces, which came from the *Aragonesa* mine, property of Mr. Angel. Its purity, its whiteness and its finish, were such that a silversmith could not have improved it.

The red-ore is rarer here. The soft silver-ore known under the name of *Aierado*, is—according to Professor Stelzner—an intimate mixture of argentiferous-galena and blende, or black-jack. Sulphur, here as elsewhere, plays the same part; it appears under different colors, and thus gives rise to rumors of the discovery of new riches.; and these rumors are easily believed by the workmen, who as yet know nothing about the terms of mineralogy, petrography and geology, and even by their superiors who do not know how to distinguish quartz from spathous limestone.

At present, we will limit ourselves to observations on the richest veins, as they are the only ones which have been worked for the last sixty years. An enormous number have already been discovered, but no mine exists of more than 40 metres in depth.

The veins of *Caldera* are very rich in iron; they often contain pure native-iron, and several among them give silver-ores known under the name of *Pacos*.

Some mines—like the *Aragonesa*, for example—contain quartz, spathous limestone and manganese, which at a certain depth often include quite a large quantity of grey-lead, and of yellow blende, or false-galena.

Latterly, regular works have commenced in some mines which cannot fail to give good results. Thus a good shaft is being dug in the *Aragonesa*, which will be continued to *San Pedro*.

A regular explotation, directed by *savants* and practical persons, would decuple the production, which, badly directed, hardly gives 15,000 marks at present.

Cerro-Negro is found to the South of *Caldera*, from which it is separated by a deep valley with steep sides. The district which bears this name comprises about two square leagues. The mountains are still formed of graywacke, and in the higher regions, where most of the veins are found, the ground is intersected by eight thick strata of porphyry.

Contrary to *Caldera*, where the greatest part of the veins are narrow, those of *Cerro-Negro* are often of considerable breadth, and proportional length. I will mention the *Viuda* vein, which is from 4 to 6 feet broad, and some thousands of metres long. Nine or ten mines are at present found in this single vein, and they represent a total length of 6,000 feet. The mine of *Santo Domingo*, not so rich as the preceding, has in some places a breadth of 12 feet.

The nature of these veins, their products, their direction and their value, are very variable. They generally run from East to West, but they are never parallel to the layers of porphyry, whose direction is from South West to North East. Moreover, at the summit of the mountain, at the hight of 17,000 feet above sea-level, great quantities of flat-bottomed stones, and of euphotides mixed with layers of schist, are found. I believe that all the veins are either hollow, or broken in their neighborhood.

The *Peregrina* mine is, without dispute, the first in this district. It is the property of Mr. Fernandez, and from one single gallery dug in one of its veins the distance of 30 metres, has produced more than 30,000 marks of silver; for more than a year past its production has always increased.

Santo Domingo, Viuda, San Francisco, San Andrés, Rosario, Yareta, Gredas, Cienega, etc., are among the renowned mines; they are worked without cessation, and many bars of silver have been sent to Córdoba and Buenos-Aires.

Twenty large associations have been formed for the purpose of working to their depths the veins of *Cerro-Negro*, by digging shafts. One of these, belonging to Mr. G. Friolan, as I am assured, is almost finished. This gentleman is the proprietor of some thirty mines or mining localities, where the silver ores as yet known,

are found; viz., argentiferous-galena, red-ore and native-silver: the chlorure of silver is rarer.

The climate of *Cerro-Negro* and of *Caldera*,—at the hight of 12,000 and 14,000 feet—is less rigorous than that of the other mountains, and when the existing clay-cabins shall have given place to better constructed dwellings, their inhabitants will no longer be exposed to the great inconveniences caused by the abundant rains which fall during the three first months of the year.

Until the railway reaches the foot of *Nevado*, only these two districts can be exploited. It is very necessary to establish roads in these regions, which can be travelled without danger. Those which exist are unworthy of the name, for it requires a day and a half to go on horse-back from *Villa Argentina* to *Cerro-Negro*, only a distance of $6\frac{1}{2}$ leagues, including the turns the road.

Before terminating this chapter I will give some particulars about the preparation of the ores.

The amalgamation *en masse* known by the name of *American*, was the only system adopted some fifteen years ago; but since then it has been replaced by the amalgamation in casks. Nevertheless, the instruments necessary to amalgamate the silver in the gluey paste of mercury by the kneading of feet, are yet found in many forges.

The *pilquineros—angl.* miners who work on their own account —yet employ this system for the small quantities they collect, whether in their own escavations or in the abandoned mines.

Latterly a house of commerce has been established here to buy and export the ores, which is of great importance for the proprietors of small mines.

The amalgamation in casks is performed in an empirical manner, none of the operators having any idea about what is called a chemical process.

Of six laboratories which have some importance, two are in complete ruins, and only two are in activity. The modern method which uses the chlorure of copper and amalgam of lead is followed here: but the zinc and lead-ores and the great variety of other combinations, render the process very difficult and costly.

Sr. Fernandez wishes to establish a forge for silver here. In case he should realize his intention there is no doubt that the amalgamation at Famantina ought to cease, because the price of the mercury is very high, and the method is otherwise costly, as it only employs primitive machines which give imperfect results.

I have said above that the zone of the silver-ores in the district of *Mexicana* has a depth of only some 40 metres, and that at this point the ore is replaced by the sulphuret of arsenic

and a combination of antimony. These ores called *metales frios —ang.* cold-ores—hardly ten years ago caused the miner to despair, and always as soon as he met them, he renounced his dreams of wealth. Not only these very abundant ores had no merit in his eyes, but he even considered them as hurtful, because they occasioned a considerable loss of mercury to the free amalgamation. The miner believed himself obliged to return upon his steps, to perforate anew the narrow belt of *metales cálidos— angl.* hot-ores—, and thus continue until his whole mine would fall in.

The value of these argentiferous copper ores could not long remain unknown, and infructuous efforts were made some ten years ago to smelt them. The two first forges were not established until some two years past, and their existence is still precarious on account of the great difficulties which are to be surmounted. One of these established at *Escaleras,* is specially occupied in smelting the ores of the *San Pedro* district, rich in copper and poor in silver; whilst the other is occupied by the ores of the district of *Mexicana,* which are rich in silver and poor in copper.

The ores are transported on mules to the forge of *Escaleras* only distant seven and a half leagues from the mines. Yet it often happens that the animals require six days—and they never take less than four—to make the round trip. This assertion will not astonish those who know by experience the local and meteorological difficulties which are presented at each instant in this region. The obstacles which mining industry has to conquer here, may be estimated by the sole fact that it requires from 500 to 600 mules and 50 or 60 drivers, to transport enough ore per day to serve a small furnace of only 120 quintals.

Only railways can bring a favorable change to this state of things. By an easy calculation, the forge of *Escaleras* with its four furnaces—two furnaces and two refineries—would require for the transport of the ores and the fuel, at least 1500 mules per annum, which represent a capital of 80,000 dollars subject to continual losses.

The ores which are transported to *Escaleras* have a mean value of 25 % of copper, 0.04 of an ounce of gold, and from $^3/_4$ to 1 ounce of silver per quintal. They are burnt either in heaps or in furnaces, after which they are wood-smelted in furnaces 19 + 10 feet large. There results:—

30 to 35	quintals	of roasted ore,
10	»	of scoriæ for making crystalized copper,
3	»	flrst copper scoriæ,
1 to 3	»	gravelly-rubbish with copper, and sometimes a little lime.

After six hours of heat this charge melts and gives a red-stone with from 45 to 55 % of copper: it is thereafter melted again in a refining furnace with a current of free air; then it is roasted until crystallization appears. As soon as the copper separated amounts to 3 or 4 quintals, it is drawn-off and the spiculæ are obtained together with a bad species of arsenic, antimony of copper, 4 ounces of silver, and half an ounce of gold per quintal, as well as a hard-stone which holds from 70 to 80 % of copper. The spiculæ of copper are melted separately in quantities of 30 quintals, and give 96 % of copper. The black-stone is reformed into bars of copper of from 95 to 99 %. The furnaces employed for this operation have chimneys of some 20 feet high and are generally constructed of *Payman* stones, which are recognized to be of excellent quality. These are composed of sand united by an argillaceous cement: the amount of gravel formed at the places where the melted mass touches them, proves a sufficiently energetic corrosive action, but this is easily remedied by employing fire clay to line the walls of the furnace. The superiority of this stone is proved at *Escaleras*, where a furnace has been in use for more than six months, without a single repair to it being necessary.

When a sufficient quantity of argentiferous ore is on hand, it is roasted and smelted in the same manner. The stone obtained is then purified by a second affinage to the required value of copper and silver.

Bars of copper and silver have been sent to Chile, containing as follows:—

I.

Copper.....	71 %
Silver.....	2 1/4 marks per quintal.
Gold.....	1/5 of an ounce »

II.

Copper.....	75 %
Silver.....	2 marks per quintal.
Gold.....	1/5 of an ounce »

III.

Copper.....	87 %
Silver.....	2 1/8 marks per quintal.
Gold.....	2/9 of an ounce »

The second forge named *Progreso* is situated nearer to the *Villa Argentina*. The ores of the *Mexicana* are smelted there, but inasmuch as it is the habit never to assay the metals here, I cannot say anything about the process employed, or the results obtained.

Aside from these mineral riches using the strict sense of the words, both *Nevado* and *Famatina* possess yet other mineralogical treasures, which the construction of railways will some day bring into market.

For instance, at the foot of the *Negro-Overo* to the North of the *Mexicana* a large number of veins are found, the greater part of which contain arsenical-gravel, and even the galena of antimony and grey-lead.

More to the North and on the Eastern slope of the *Famatina* in some isolated hills of porphyry and schist, some veins of gold are found, which extend beyond the sedimentary layers of this district: these are the mines of the *Rio-Blanco.*

Still ascending, spots of rose-colored and clear-green alabaster are met with in the same sedimentary layers. Always following the same direction, we arrive at the mines of Jamesonite, of Angulas, and at the deposits of graphite. After these come the rich veins of the copper-galena of *Potrerillo* and the great district of *Cerro-Negro de Tinogasta*, abounding in ores of oxydized-copper; these districts belong to the Province of Catamarca.

The slopes of this mountain may be explored then in a circumference of five leagues, and the miner will always find some interesting product. It is the same in the district of *Oyadú*, upon the Bolivian frontier, which is very rich and of a great interest to science although as yet unexplored. It is quite possible that it belongs to the same chain and the same formation.

Although at present, perhaps, the riches of the *Famatina* are exaggerated, it is nevertheless true, that its mines are of extraordinary importance to Rioja and the neighboring Provinces, as well as, that their future principally depends upon their proper explotation.

CHAPTER XII.

THE NATURAL SULPHATES OF THE PROVINCE OF CATAMARCA.*

In an article published in the third number Vol. I, of the *Bulletin of the National Academy of Sciences of the Argentine Republic*, I gave my opinion respecting the formation of the salt-beds which cover considerable portions of the Province of Catamarca. I also related the geological and hydrographical conditions of the district in which the smaller of these salt-deposits is found, describing it as a species of small-basin or depression, which occupies the lower part of the table-land, whence flow the torrents which come from the neighboring mountains.

The sediments brought from these mountains is deposited here mixed with slimy mud, which when dried by atmospheric evaporation, determines an efflorescence produced by capillary attraction.

This layer of salt is due to the continual decomposition which is annually repeated; and the precipitation of the salts not only takes place in strata and distinct crusts, transforming the underlying argillaceous earth according to the different capillary coefficients, but the contact of the saline solution with the essential parts of the earth, originates by absorption a chemical metamorphosis which produces new combinations, as for example—and in greater part—that of chalk.

The present paper upon some of the natural sulphates of the Provinces of Catamarca and Rioja, will give some proofs in favor of my opinion.

All labor in closed habitations being impossible during the heat

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* By Federic Schickendantz; Pilciao foundery, Catamarca.

of summer, the only proper time for experiments is during the winter—from April to September—although the N. E. wind called *Zonda,* which prevails during the cold season brings with it so much dust, that it is an obstacle to all exact chemical investigation.

I have generally followed the ordinary method in my analysis; nevertheless, as I have changed it in some cases, I ought to give some explanations in reference to them.

As the substance analyzed could not always be reduced to powder on account of the hardness of some salts, I have always used two portions.

FIRST PORTION.

2 or 3 grammes were heated in about 100 c. c. of water; after 12 hours the solution was filtered in a filter dried at 125° C.; it was then weighed, and the residuum having been dried at the same degree of heat, it was again weighed, and then burnt until the weight remained constant. The loss occasioned by the combustion was determined under the head of "organic substances," although it proceeded sometimes from sulphuric acid freed by the decomposition of insoluble basic salts. I first determined the chlorine when it existed in the solution; then, after having separated the excess of silver, I filled the filter even up to 500 c. c., and took two portions of 200 c. c. each, which being treated in the same manner quantitively produced sulphuric acid, oxide of alumina and magnesia. The silicic and nitric acids, as also other rarer substances, have not been taken into consideration. I had to renounce the separation of the sesquioxide of magnesia by means of ammonia and the sulphate of ammonia, on account of indecisive results, due to the presence of carbonate of ammonium which is always found in the ammonia of commerce, and which continually increases as the bottles are uncorked. For this reason I heated the very acid fluid to the temperature of ebullition, adding drop by drop, ammonia purified by lime, until the moment in which permanent variegated spots commenced to appear; after boiling for some minutes an excess of ammonia was added, which was again expelled by farther boiling for some time. Mr. Knop, as I afterwards learned has recommended a similar method in the periodical called *Landwirthschaftliche Versuch-station,* of 1874, N° 1, received here in the month of June. I saturated the magnesia with phosphate of ammonia. Some small quantities of lime which are met with in various sulphates, are represented as magnesia.

Even adding 4 or 5 grammes of substance only small spots of the phosphate or sulphate of magnesia were obtained, therefore, I did not take the trouble to determine this substance.

SECOND PORTION.

This portion served to determine the amounts of water and alcaline substances. A proper drier—like that Sprengel for high temperatures—being wanting the substance was heated in a crucible of platina fixed over a lamp of Berzelius provided with a chimney, in such wise that the bottom of the crucible was one decimetre distant from the wick, which was as low as possible. Heated in this way, the purest substances swelled, formed bubbles, and lost their water with considerable rapidity. The residuum was generally of a reddish-brown color, and I made use of it to determine the quantity of the organic substances. From the residuum of the first portion the organic substances ought also to be calculated, because it is evident that the quantity of water is equal to that of the volatile, less the organic, substances.

A correction was necessary when chlorine existed, because I am convinced that it escaped in combination with magnesia, in the form of vapor. In this last case the true insoluble residuum was = to the residuum + the organic substances — the magnesia (corresponding to the chlorine) and the water = to the volatile portion — the organic substances — the chlorine + the oxigen (equivalent to the chlorine). Afterward I saturated the oxide of alumina and the magnesia with baritic water expelling the excess of this with sulphuric acid: then the alkalis were determined with the ordinary precautions, as sulphuric salts. For the purpose of proving that there was no loss of sulphuric acid, I have also determined it in this portion.

Passing now to the description of the sulphates, I begin by that which I took from the *Sierra del Atajo*.

A.

Sierra del Atajo is the name which has been given to the small crest of mountains bounded on the west by the *Sierra de Capillitas*, and terminating in the *Nacimientos de Vis-Vis*.

It is principally formed of trachitic rocks cut up by metallic veins. Near the foundery of *Puerto del Atajo*, it appears to be formed of a grey and compact rock which contains quartz crystals, whilst the hollows and cavities are lined with yellow-ochre. Professor Stelzner after having read the description which I made of this mineral in the article *Eine Bergreise* *, wrote me that it is a species of quartzose trachyte, and that a similar mineral accompanies the gold-veins of Hualilan.

In the Argentine Republic the metal veins are generally accom-

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* See *La Plata Monatschrift*, by R. Napp, 1874, N° 3, etc.

panied by trachyte, as Prof. Stelzner says in a report published here. * The same peculiarity is observed in Chile. †

In the *Revue scientifique* of March 1874—Nos. 36-37, an interesting article of Mr. Boussingault appeared, in which the travelling *savant* announces the presence of sulphuric and hydrochloric acids in the sulphur-beds and smoking craters of New Granada, and gives an explanation of their formation—which appears to me to be very just—based upon the reaction of steam at a very high temperature, upon sulphate and alkaline chlorates, silicic minerals being present also.

Mr. Boussingault supposes that these salts are found in the interior of the earth, but does not resolve the problem of their origin. Do they come from the sea-water, or do they pre-exist n the rocks? Are these sulphates born of the sulphur of the volcanoes, or is this sulphur the produce of the sulphates?

These are questions which I will attempt to answer. The generally accepted hypothesis supposes, that primitively our globe was a gaseous mass which becoming condensed later on, formed a liquid and burning mass, to which time has given a solid crust.

It is not possible to form an exact idea of the chemical phenomena which have contributed to the formation of our globe. We can only imagine that when it was nothing but a gaseous mass, the elements already possessed the property of combination, the less volatile substances becoming successively condensed.

How for example, have oxigen, carbon and hydrogen, united to their bases, and what relations do they hold to the metals? We cannot tell.

Nor do we know whether silex and the metals were oxydized at the same time as sulphur; whether chlorine united first with the metals, and if so, whether the chlorids were decomposed by the steam, or whether on the contrary, the acids were transformed into chlorids, and formed water by means of the oxyds.

Nevertheless, there is one fact demonstrated: the superior crust of our globe not only contains alkaline silicates, but also chlorids and sulphates. The primitive rains which washed these rocks, brought down the salts with them, a part of which were deposited on the lower lands, whilst the soluble substances remained in dissolution in the lakes and seas.

All then was action and reaction.

The rain-water penetrated through the rocks to the volcanic regions, where being evaporated it rose as steam to the surface, meeting on its way the sulphates and chlorids: or rather the water on passing over the stones carried the salts with it to the interior:

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* See *Anales de Agricultura de la Republica Argentina*, 1873.
† See Pissis, *Berg und Hüttenmännische Zeitung*, 12-61.

then, according to the theory of Mr. Boussingault, the decomposition of the chlorids and sulphates took place, and the salt-water in contact with the volcanoes, produced the phenomena observed in *Purase* and in *Tolima*.

The products of this decomposition are acids: sulphurated hydrogen, sulphur, sulphuric and sulphurous acids which form new combinations with the metals.

The efflorescences of *Atajo* appear to me to have a similar origin, and I find the proof of this in the presence of quartz, a mineral generally rare in trachyte. The red-ochre in the cavities, doubtless arises from the decomposition of the sulphate of the oxyd of iron.

The substance A form crusts of a white color half an inch thick. It is a crystalline and laminated structure; nevertheless I have also found acidulated crystals in the cavities.

Here is the analysis of two pieces taken from different places in *Atajo*. The sulphate of the oxyd of alumina, mixed with sulphate of magnesia and sulphate of soda, is found there.

ANALYTICAL EXPERIMENTS.

First piece.

FIRST PART.

1st Analysis.

	Grammes.	
Amount of material employed.....	2.2820	
Dry residuum at 125° C.....	0.1647	
Soluble part.....	2.1173 =	92.782 %
Sulphate of baryta in 200 c.c. 0.9416; SO^3 in 500 c.c...	0.8079	
" " " " 0.9417; " " " "	0.8078	
Sulphuric acid (calculated from the soluble portion like all the other substances =		{ 38.157 „ / 38.150 „
Oxyd of alumina..... in 200 c.c. 0.1229; in 500 c.c.	0.3073 =	{ 14.511 „
" " " " " 0.1230; " " "	0.3075 =	{ 14.523 „
Phosphate of magnesia in 200 c.c. 0.6456: MgO. " " "	0.0417 =	{ 1.940 „
" " " " " 0.0456; " " " "	04710. =	{ 1.940 „

2d Analysis.

Amount of material employed..	1.8874		
Dry residuum at 125° C.....	0.2084		
Soluble part.....	1.6790 = 88.958 %		
Sulphate of baryta in 200 c.c...	0.7500;	SO^3 in 500 c.c.	{ 0.6437 = 38.338 %
" " " "	0.7496;	" " " "	{ 0.6435 = 38.326 „
Organic substances in residuum	0.0158.		

The quantity of oxyd of alumina or of magnesia has not been determined.

SECOND PART.

1st Analysis

Material employed	1.3848
Residuum	0.0890
Organic substances.....	0.0047
(Ought to be, according to calculation)	0.0069
True insoluble residuum.....	0.5664
Lost by escapement	0.0912
Soluble portion	1.2936
Water ..... 0.5664 — 0.0022 ....=	0.5642 = 43.615 %
Sulphate of baryta... = 1.4384; SO^3..	0.4939 = 38.178 „
Sulphate of soda .... = 0.0424; Na^2O	0.0185 = 1.431 „

2d Analysis

Material employed.....	1.2740		
Resíduum.....	0.1041		
Organic substances	0.0054		
(According to calculation, ought to be)	0.0081		
Lost by escapement.....	0.5086		
True insoluble residuum	0.1068		
Soluble portion.....	1.1672		
Water.....	0.5059	=	43.343 %
Sulphate of baryta...	1.3060; SO^3	0.4484	= 38.418 „
Sulphate of soda	0.0440; Na^2O	0.0192	= 1.645 „

Chlorine and oxyd of iron, were found in infinitesimal quantities.

General result of this analysis.

Sulphuric acid	38.240
Oxyd of alumina	14.517
Magnesia.....	1.940
Soda.....	1.538
Water.....	43.479
	99.714

Eliminating the sulphate of magnesia and the sulphate of soda, we obtain:—

		Taken at 100
Sulphuric acid.....	32.377	35.825
Oxid of alumina....	14.517	16.063
Water.....	43.479	48.112
	90.373	100.000

This composition responds to the formula:—

$$Al^2\ O^3\ 3SO^3 + 18\ H^2\ O.$$

Boussingault * has analyzed a similar salt from *Pasto*, *Ramelsberg de Bilin*:—

	Fórmula	Atajo	Pasto	Bilin
Sulphuric acid	35.983	35.825	35.68	35.31
Oxyd of alumnia...	15.442	16.063	14.98	15.86
Water	48.575	48.112	49.34	48.83
	100.000	100.000	100.00	100.00

SECOND PIECE

FIRST PART.

1st Analysis

Material employed	1.7244				
Residuum	0.3897				
Soluble portion.....	1.3347 = 77.528 %				
Sulphate of baryta in 200 c.c....	0.5916;	SO^3 in 500 c.c.	0.5077	=	38.042 %
" " " "	0.5848;	" " " "	0.5020	=	37.621 "
Oxyd of alumina in 200 c.c.....	0.0740;	in 500 c.c.	0.1850	=	13.860 "
" " " "	0.0755;	" " "	0.1883	=	14.117 "
Phosphate of magnesia.....	0.0409;	MgO in 500 c.c.	0.0368	=	2.757 "
" " "	0.0394;	" " " "	0.0355	=	2.735 "

2d Analysis

Material employed.....	2.1040				
Residuum	0.5497				
Organic substances	0.0359				
Soluble portion.....	1.5543 = 73.873 %.				
Sulphate of baryta in 200 c.c. =	0.6933:	$S0_3$ in 500 c.c.	0.5950	=	38.281 %
" " " " " "	0.6893;	" " " "	0.5917	=	38.075 "

☞An accident prevents me giving the determination of the other substances. Another analysis gave for the

sulphuric acid ..... { 38.523 %
38.342 %

SECOND PART.

1st Analysis

Material employed.....	1.7572	
Residuum by weight.....	0.3574	
Organic substances.....	0.0154	
(Ought to be, according to calculation).	0.0239	
True insoluble residuum	0.3659	
Lost by heat	0.6152	
Water	0.6067	=43.696 p. %
Sulphate of soda = 0.0456 Na^2O	0.0199	1.431 "

* See Gmelin, vol. II, p. 284.

2d Analysis

Material employed	1.5412
Residuum by weight	0.3426
Organic substances	0.0133
(Ought to be, by calculation)	0.0273
True insoluble residuum	0.3566
Lost by heat	0.5264
Soluble portion	1.1846
Water	0.5124=43.253 p. %
Sulphate of baryta = 1.0288; SO^5	0.4562=38.515 „
Sulphate of soda = 1.0409; Na^2O	0.0174= 1.507 „

General result of these analysis.

Sulphuric acid	38.217
Oxyd of alumina	13.942
Magnesia	2.746
Soda	1.469
Water	43.429
	99.803

Substracting the magnesia and soda which are found in small quantities, we have:—

		Taken at 100	Formula
Sulphuric acid	30.889	34.998	35.983
Oxid of alumina	13.942	15.776	15.442
Water	43.429	49.206	48.575
	88.260	100.000	100.000

The difference which exists between the analysis and the formula, is doubtless owing to the quantity of water existing in the sulphate of magnesia, which we have neglected in the calculation.

EB.

Travelling from *Atajo* towards the South, and having left upon the right the cavity of *Campo-blanco* which appears like a crater, we pass among granite-rocks cut up by veins of trachytic tuff, and come to a little triangular table-land, one side of which looks towards *Vis-Vis* from which it is separated by craggy, unconnected declivities. The other side is opposite to the *Quebrada de los Nacimientos*, to which leads a road down its face, across rocks of granite, interlaced by veins of red-oxyd of iron at the foot of the mountain, whilst at the top, in *Portezuelo*, sedimentary red-rocks are found of small thickness, which correspond to the *Red Houses* of the Eastern slope of the *Sierra de las Capillitas*.

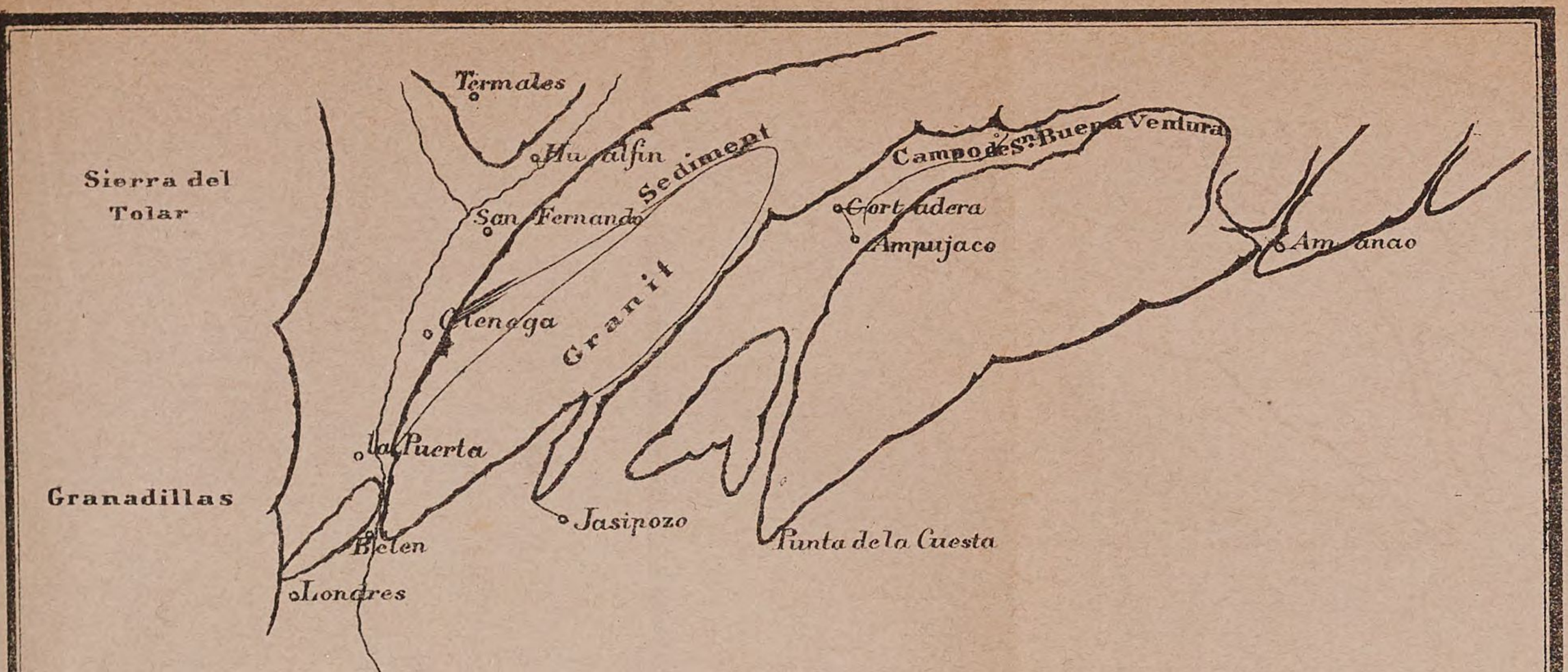


Fig.I

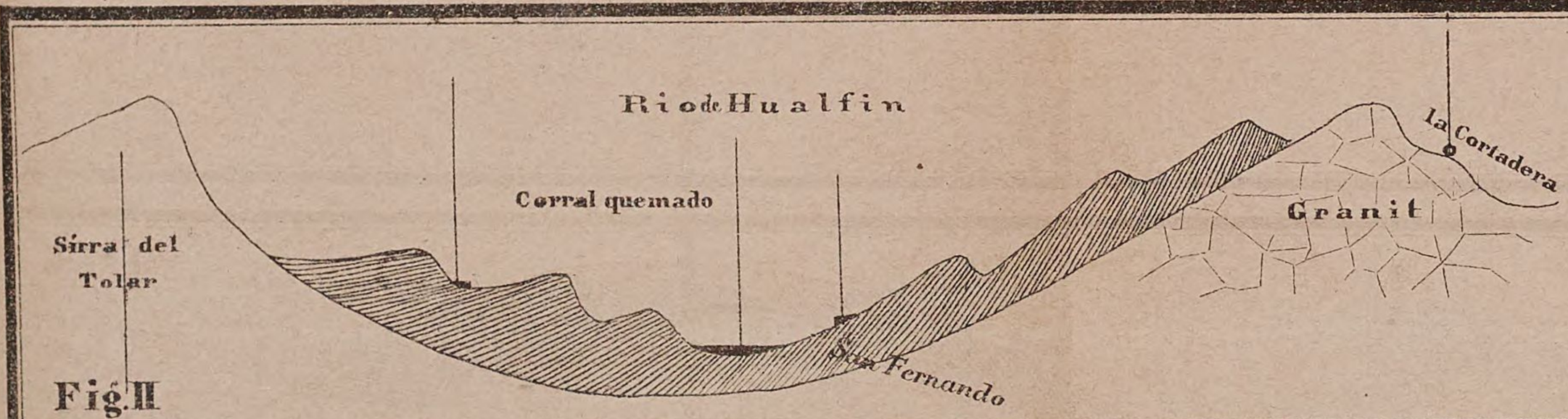


Fig.II

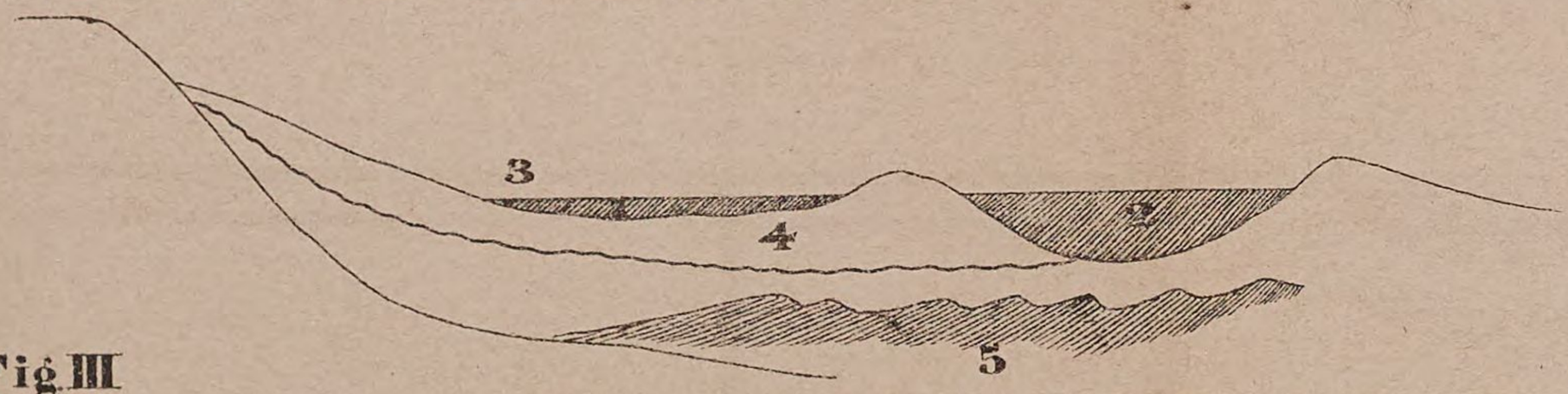


Fig.III

1. Capas de sal de formacion primaria	Primäres Salzlager	Couche de sel de la formation primaire	Salt stratum of primary formation
2. id. id. id. segundaria	Segundäres do	id. id. id. secondaire	do secondary do
3. Salina	✳ Saline	✳ Saline	✳ Saline
4. Corriente de agua subterraneo	Wasserzufluß	Cours d'eau souterraine	Current of subterranean water
5. Rocas estratificadas (Jasi)	Geschichtete Gesteine (Jasi)	Roches stratifiées (Jasi)	Laminated rocks (Jasi)

From the *Quebrada de los Nacimientos*, we follow the river which runs from East to West, and which is enclosed by a granite chain on the South, and trachytic hills on the North. In *Portezuela de San Buena Ventura* we descend to a narrow and dark defile, surrounded by high trachytic rocks; this is one of the most interesting spots to the geologist. The defile conducts us to a wider valley called the *Campo de San Buena Ventura*, crossing this we come to another defile notable for a small spring which spouts from the dry river-bed, and thereafter arrive at *Cortadera*, an *estancia* (cattle-farm) situated at *Ampujaco*. We are here in the same latitude as *San Fernando*, from which we are only separated by the *Sierra de Belen*, whose highest peak situated in front of *Cortadera*, can be distinguished from various points, and on this account is an important land-mark.

The river which we have passed, flows into another which comes from the North at this *estancia:* after following the latter for a couple of leagues, we pass the divide by a steep and very dangerous path. This is the boundary between the sedimentary rocks which run more to the N. W., and the center of the granite of the *Sierra de Belen*, as is seen under figure I.

The *Laguna Blanca*, and the deserted mountains of *Gulampajá* covered with sand-banks, are seen from the top.

After passing a defile full of great stones, very high and perpendicular pillars of granite are seen: soon after a little hill is surmounted, and then an open valley is met with which extends towards the West, and reaches to *Cienaga* in the bed of the river *Hualfin*. On the right can then be seen towards the West, the deposits of the tertiary epoch, which, forming perpendicular walls or isolated columns, are corroded by the rains and covered with vegetation. On the left a mountain of granite appears, of which an idea is given in fig. II.

Various small springs sprout from the granite in this valley. Their waters are strongly alkaline, and deposit in the sand of the shore thick crusts of a yellowish color, which principally contain carbonate of soda--Ceollpa.

I suppose that they come down from the hights, and meeting the sulphates which abound in the trachyte which forms one of the principal elements of the lands situated to the East of *Cortadera*, they dissolve them, thereafter filtering them through the strata—very abundant here in the granitic mountains—of calcareous stone.

According to the preceding, I believe I can give the following formula to the substance described under A:—

$$4\ (Al^2\ O^3.\ 3\ S\ O^3 + 18\ H^2\ O) + 2\ Mg\ O.\ S\ O^3 + Na^2\ O.\ S\ O^3$$

Under the inflnence of carbonate of lime, it would give:—

$$4\ Al^2\ O^3 + 13\ (Ca\ O.\ S\ O^3 + 2\ H^2\ O) + Mg\ O.\ S\ O^3 + Na^2\ O.\ C\ O^2 + e2\ C\ O^2\ 46\ H^2\ O.$$

I do not believe in the reciprocal influence of the sulphate of magnesia and carbonate of lime.

According to Otto, the reaction of these two bodies could not take place (*vide* Graham Otto, p. 608): on the contrary, the decomposition of carbonate of magnesia and chalk, in sulphate of magnesia and carbonate of lime, seems to be verified, because the Ceollpa contains the sulphate of magnesia.

However that may be, I cannot modify my opinion respecting the formation of the carbonate of soda and the chalk.

In the formation of alumina and chalk, the carbonate of soda remains in the water in dissolution, and the carbonic acid is freed.

Does the chalk—so abundant in the Andes—owe its formation to reactions of this nature? And the great deposits of soda lately discovered in North America, do they also owe their origin to decompositions similar to those I have preciously described?

I answer affirmatively to these questions, and at the same time call the attention of my readers to the phenomena which evidently accompany the formation of chalk and the production of carbonic acid.

The valley above-mentioned near the village of *Cienaga* on the river *Hualfin*, widens more and more towards its mouth, extending down to the village in a broad level. The river is followed to the *Puerta de Belen:* thence the hill is ascended where the few houses of the *Puerta* are found hidden under magnificent trees: a little farther on there is a small meadow.

The nearest hill to the river is composed of limestone and ferruginous conglomerates, which doubtless—like those of the hills of *Javi* found more to the West—appertain to the sediments of the tertiary epoch.

Streams which are continually overflowing, descend from these hights and water the meadow. Towards the South rises a small cone corroded by the rains, and in the walls of its gullies a salt efflorescence—studied in B—is found. In the village of *Puerta* it is employed to wash wool, without, however, much success.

In the cavities this salt forms thin crusts of small and relucent crystals.

It is not possible to obtain large quantities in a state of purity, because it contains sand mixed with organic substances; therefore its analysis is very difficult.

FIRST PART.

1st Analysis

Material employed.....	2,9100	
Residuum, dried at 125° C.....	2.7177	
Soluble portion.....	1.1922 —	30.494 %

Organic substances			0.1854	
(with organic substances) =	0.0232;	clorine.....	0.0057 —	0.480 %
Sulphate of baryta.... in 200 c.c.	0.5823;	SO^3 in 500 c.c.	0.4997 —	41.913 „
„ „ .... „	0.5878;	„ „ „ „	0.5045 —	42.313 „
Oxyd of alumina ..... in 200 „	0.0228;	in 500 c.c.....	0.0570 —	4.780 „
„ „ ..... „	0.0227;	„ „ „	0.0567 —	4.751 „
Phosphate of magnesia.. „	0.1251;	MgO in 500 c.c.	0.1125 —	9.435 „
„ „ .. „	0.1232;	„ „ „	0.1109 —	9.297 „

2d Analysis

Material employed.....			3.6696	
Residuum			2.6585	
Soluble portion			1.0111 =	27.551 p%
Organic substances in residuum.....			0.1817 =	
Sulphate of baryta in 200 c.c.	0.4754;	SO^3 in 500 c.c...	0.4080 =	40.352 „
„ „ „ „	0.4791;	„ „ „ „	0.4112 =	40.668 „
Oxyd of alumina.... „ „	0.0184;	in 500 c.c.	0.0460 =	4.545 „
„ ..... „ „	0.0182;	„ „ „	0.0455 =	4.500 „
Phosphate of magnesia in „	0.1083;	MgO in 500 c.c.	0.0935 =	9.247 „
„ „ „ „	0.1016;	„ „ „ „	0.0915 =	9.049 „

A small error committed in the determination of the residuum, caused the difference between the two analysis.

SECOND PART.

1st Analysis

Material employed		1.9566
Residuum, by weight		1.2883
Organic substances.....		0.0266
(According to the 1st part, ought to be).		0.0924
True insoluble residuum.....		1.3503
Soluble portion.....		0.6063
Lost by heat.....		0.2550
Water.....		0.1870 = 30.843 %
Sulphate of baryta..	0.7532; SO^3	0.2586 = 42.652 „
Alcaline sulphates.....		0.1375 (See 2d analysis).

2d Analysis

Material employed.....		1.9218
Residuum, by weight.....		1.2598
Organic substances.....		0.0521
True insoluble residuum		1.2923
Soluble portion		0.6295
Lost by the heat		0.2431
Water.....		0.2043 = 32.454 %
Sulphate of baryta ..	0.7532; SO^3....	0.2583 = 41.032 „
Alcaline sulphates.....		0.1420

In this last, the sulphuric acid is represented by:—

Sulphate of baryta.....	0.2189; SO^3..	0.7516

Consequently:—

Sulphate of soda	0.0946;	Na^2O. = 0.0412 =	6.546 %
Potash	0.0474;	K^2O.. = 0.0256 =	4.066 „

In the first analysis when the same relation is accepted between the soda and potash, we have:—

Sulphate of soda ..	0.0916; $Na^2 O$...	0.0400	= 6.597 %
Potash.....	0.0459; $K^2 O$....	0.0248	= 4.090 „

I have observed traces of manganese.

According to its formation the substance also contains nitric acid, carbonic acid and ammoniac, which nevertheless have been neglected.

General result of these analysis:

Sulphuric acid.....	41.312
Oxyd of alumina	4.642
Magnesia.....	8.986
Chlorate of magnesia.....	0.642
Soda.....	6.572
Potash.....	4.078
Water	31.648
	97.880

Putting aside the chlorate of magnesia and taking the remainder at 100, a composition results which corresponds to the following complicated formula:—

$$5\,MgO.\,SO^3 + Al^2\,O^3.\,3\,SO^3 + 25\,Na^2\,O.\,SO^3 + K^2\,O.\,SO^3 + 40\,HO.$$

		Formula
Sulphuric acid.....	42.482	41.967
Oxyd of alumina.....	4.773	4.698
Magnesia.....	9.241	9.123
Soda.....	6.759	7.070
Potash.....	4.194	4.298
Water	32.549	32.844
	100.000	100.000

Nevertheless, I am very far from believing that this substance in view of its complicated composition, is a special mineral matter: I think on the contrary, that it is nothing more than a mixture of alum, magnesia, and alkaline sulphates.

C.

Along the river *Hualfin*, the road leads to *Antofogasta*, a small town built on the frontier of Bolivia, near which rises the volcano of Antofogasta whence come the salts I describe under C and D.

The first of these two salts was given to me under the form of a white mass, which little by little cracked in diverse directions. They are composed of small opaque crystals, but in the interior are seen transparent crystals.

FIRST PART.

1st Analysis

Material employed		1.3885	
Residuum		0.0313	
Soluble portion		1.3571 =	97.746 %
Sulphate of baryta in 200 c.c.	0.5590; SO^3 in 500 c.c.	0.4798 =	35.351 „
„ „ „ „	0.5617; „ „ „	0.4820 =	35.514 „
Oxyd of alumina „ „	0.0078; „ „ „	0.0195 =	1.436 „
„ „ „ „	0.0077; „ „ „	0.0193 =	1.419 „
Phosphate of magnesia „	0.2433; „ „ „	0.2190 =	16.135 „
„ „ „ „	0.2431; „ „ „	0.2170 =	15.988 „
Organic substances in residuum		0.0056	

Analysis 2d

Material employed		1.8656	
Residuum		1.0487	
Soluble portion		1.8169	
Organic substances		0.0101	
Chlorid of silver	0.0018; clorid	0.0029 =	0.160 %
Sulphate of baryta in 200 c.c.,	0.7506; SO^3 in 500 c.c.	0.6440 =	35.445 „
Oxyd of alumina „ „	0.0081; „	0.0202 =	1.114 „
„ „ „	0.0 81; „	0.0202 =	1.114 „
Phosphate of Magnesia „ „	0.3262; MgO „	0.2938 =	16.172 „
„ „ „	0.3247; „ „	0.2925 =	16.099 „

A third analysis has given with 1.9391:

Organic substances	0.0088 (residuum 0.0443)	
Chlorid of Silver	0.0123; chlorid 0.0034	0.160 %

SECOND PART.

1st Analysis

Material employed		1.0063	
Residuum by weight		0.0167	
True residuum		0.0192	
Soluble portion		0.9871	
Lost by heat		0.4730	
Water		0.4685 =	47.462 %
Sulphate of baryta	1.0016 SO^3	0.3439 =	34.839 „
Soda (also a little potash)	0.0217 Na^2 0	0.0092 =	0.932 „

2d Analysis

Material employed		0.9654	
Residuum, by weight		0.0158	
Organic substances		0.0003	
True residuum		0.0185	
Soluble portion		0.9469	
Lost by heat		0.4543	
Water		0.4496 =	47.481 %
Sulphate of baryta	0.9632; SO^3	0.3307 =	34.924 „

I did not determine the soda.

3ª Analysis

Material employed.....		1.2026
Residuum, by weight		0.0176
Organic substances		0.0022
True insoluble residuum.....		0.0182
Soluble portion		1.1844
Lost by heat		0.5766
Water		0.5735 = 48.421 %
Sulphate of baryta.....	1.1832; SO^3.	0.4062 = 34.295 „
Soda.....	0.0236; Na^2O	0.0103 = 0.869 „

Results in Part I the quantity of SO^3 = 35.427 %
„ „ II „ „ = 34.686 „

Difference.. 00.741 %

This difference doubtless proceeds from the decomposition of a sulphate after heating; it ought to be deducted from the water and then remain represented by 48.047 %.

The centesimal composition of C is therefore:—

Sulphuric acid.....	35.427
Oxdyd of alumina.....	1.271
Magnesia.....	16.009
Chlorid of magnesia.....	0.214
Soda.....	0.901
Water	47.047
	100.869

Expelling the chlorid of magnesia, the sulphate of the oxyd of alumina and the soda, there remains:—

Sulphuric acid	31.301
Magnesia.....	16.009
Water	47.047
	94.361

Taking these quantities at 100, we have a result sufficiently like the centesimal composition of common sulphate of magnesia— $MgO . SO^3 + 7 HO$.

	Result	Fórmula
Sulphuric acid.....	33.176	32.521
Magnesia.....	16.966	16.260
Water	49.858	51.219
	100.000	100.000

D.

In reference to aspect this substance differs little from the preceding, it also being in the form of a white mass of a laminated

and crystaline structure. The insoluble residuum as in C, consists of a white-powder which turns red after being heated: moreover, it contains particles of a dark-brown mineral which appears to be *augite*.

I believe that the white residuum is a basic sulphate similar to *Löwigit* or to *aluminite*.

FIRST PART.

1st Analysis

Material employed		1.8554	
Residuum		0.0601	
Soluble portion		1.7953 =	96.761 %
Organic substances		0.0090	
Sulphate of baryta	in 200 c.c. 0.7918; SO^3 in 500	0.6797 =	37.862 „
„ „ „	„ 0.7919; „ „ „	0.6798 =	37.862 „
Oxyd of alumina	„ 0.0314; in 500	0.0785 =	4.373 „
„ „ „	„ 0.0310; „ „	0.0775 =	4.311 „
Phosphate of magnesia	„ 0.2213; MgO in 500	0.1994 =	11.104 „
„ „ „	„ 0.2217; „ „ „	0.1997 =	11.123 „

2d Analysis

Material employed		1.7347	
Residuum		0.0606	
Soluble portion		1.6741 =	96.506 %
Oxyd of alumina	in 200 c.c. 0.0282; in 500	0.0705 =	4.211 „
„ „	„ „ „ 0.0285; „ „	0.0713 =	4.256 „
Phosphate of magnesia	„ „ „ 0.2111; MgO in 500	0.1928 =	11.513 „
„ „	„ „ „ „ 0.2066; „ „ „	0.1861 =	11.118 „

SECOND PART.

1st Analysis

Material employed	0.1376	
Residuum by weight	0.0588	
Organic substances	0.0016	
True insoluble residuum	0.0648	
Soluble portion	1.0728 =	94.303 %
Water	0.4424 =	41.253 „
Sulphate of baryta in 100 c.c. = 0,2382; SO^3 in 500 c.c.	0.4089 =	38.131 „
Loss	0.4564	

2d Analysis

Material employed		0.8947	
Residuum, by weight		0.0491	
Organic substances		0.0009	
True insoluble residuum		0.0543	
Soluble portion		0.8404	
Lost by heat		0.3575	
Water		0.3454 =	41.337 %
Chlorid of sodium	=0.0731; Na^2O	0.0388 =	4.611 „
Sulphate of baryta	=0.9327; SO^3	0.3202 =	38.101 „

3d Analysis

Material employed	1.4322	
Residuum, by weight	0.0638	
True insoluble residuum	0.0699	
Soluble portion	1.3623 = 95.119	%
Lost by heat	0.5668	
Water	0.5486 = 40.270	„
Sulphate of soda .... = 0,1511; Na^2O....	0.0659 = 4.842	„

4th Analysis

Material employed	0.8779	
Residuum, by weight	0.0459	
True insoluble residuum	0.0454	
Soluble portion	0.8325 = 94.828	%
Lost by heat	0.3556	
Water	0.3493 = 41.958	„
Sulphate of soda.... = 0,0939; Na^3O...	0.0410 = 4.922	„

By means of other analysis in which the use of impure ammoniac denaturalized the determination of the oxyd of alumina and of soda, I obtained as a general result:—

Chlorine..... = 0.656 %

Sulphuric acid... and { 37.884 % / 38.010 „ / 38.032 „ / 38.068 „ } = 37.999 „

Taking the medium of these determinations, we have:—

Sulphuric acid	37.980 %
Oxyd of alumina	4.288 „
Magnesia	10.844 „
Soda	4.706 „
Chlorid of magnesia	0.878 „
Water	41.205 „
	99.901

I have not been able to obtain a simple formula of this composition. Putting aside the chlorid of magnesia, a mixture is obtained of alum, magnesia, and a sulphate to which I have given the following formula:—

$$(\tfrac{3}{4}\ MgO.\ \tfrac{1}{4}\ Na^2O)\ SO^3 + 4\ HO.$$

Therefore the formula of the mixture is:—

$$14\ (\tfrac{3}{4}\ MgO.\ \tfrac{1}{4}\ Na^2O.\ SO^3 + 4\ HO) + 2\ (Al^2O^3.\ 3SO^3 + MgO\ SO^3 + 24\ HO).$$

	Analysis	Formula
Sulphuric acid	38.355	38.639
Oxyd of alumina	4.330	4.522
Magnesia.....	10.977	10.974
Soda.....	4.752	4.764
Water	41.612	41.098
	100.000	100.000

E.

About three years ago I received different species of salts from *Famatina*—in the province of Rioja. These specimens sent in a cigar-box, arrived in such a state that it was not possible to separate some of the scales belonging to two different species, which I distinguish under the letter E and F.

The first species appears to be a microcrystaline salt which forms an agglomeration of nuclei covered with warts. Also some relatively large prismatic crystals are seen, similar to those of the sulphate of soda.

I will not enter into the details of my experiments, but will limit myself to the simple result of their different determinations.

I have studied two distinct fragments which were given to me with the following results:—

	Fragment I.	Fragment II.	Fragment III.
Sulphuric acid	36.449	35.616	36.033
Oxyd of alumina.....	13.146	9.921	10.261
Oxyd of iron.....	—	2.806	2.806
Magnesia.....	4.606	4.873	4.739
Soda.....	0.893	0.960	0.926
Water	45.480	45.181	45.330
	100.834	99.357	100.095

As the following comparison between the formula and the composition demonstrates, this substance principally consists of alum and magnesia, mixed with sulphate of soda. The oxyd of iron has been calculated according to its equivalent of the oxyd of alumina.

		Taken at 100.	Fórmula.
Sulphuric acid	34.838	35.879	35.754
Oxyd of alumina	12.192	12.556	11.508
Magnesia.....	4.739	4.880	4.470
Water	45.330	46.685	48.268
	97.099	100.000	100.000

F.

This species is found in crusts formed of two different salts, the one granular and clear, the other acicular and opaque. The first form predominates.

The composition is as follows:—

Sulphuric acid.....	36.724
Oxyd of alumina.....	14.281
Magnesia.....	2.300
Soda.....	0.504
Water	46.198
	100.007

As the preceding species, this is an efflorescence of the sulphate of oxyd of alumina, accompanied by sulphate of magnesia and soda.

Putting aside the two last substances, the following result is obtained:—

		Taken at 100.	Fórmula: $Al^2O^3.3SO^3+18HO$.
Sulphuric acid.....	31.474	34.468	35.983
Oxyd of alumina.....	14.281	15.641	15.442
Water	45.556	49.891	48.575
	91.311	100.000	100.000

I would say here, that the oxyd of alumina contains oxyd of iron, and therefore very little sulphuric acid, whilst the other sulphates probably contain water, which explains the excess of water in the formula.

G.

On the road which leads from *Andalgala fort* to Tucumán, and which passes by *Carrizal*, two ravines are seen before arriving at the crest of *Carapunco*, which run one to the North West and the other to the North East, and meet again in *Horqueta*. Following the former, it is stopped by the high walls of clay and stone at the feet of which is found the efflorescence of alum, whose analysis I have already given, but without determining the alkalis. Here they are:—

Sulphuric acid.....	35.828	
Oxyd of alumina.....	10.817	11.425
Oxyd of iron.....	0.608	
Magnesia	5.901	(with trace of manganese)
Soda.....	1.046	(» » » potash).
Water	45.799	
	99.999	

This composition corresponds to the formula:—

$$C(Al^2\,O^3 . 3\,SO^3 + MgO . SO^3 + 24\,HO) + (2\,MgO . SO^3 + Na^2\,OSO^3 + 6\,HO).$$

That is to say:—

Sulphuric acid	36.860
Oxyd of alumina	10.547
Magnesia	5.460
Soda	1.058
Water	46.075
	100.000

H.

I have received the substances H and J, from the *Puerto de Belen*, where they are employed as caustics. I believe they came from the environs of *Hualfin*. The pieces are of a round form and no crystalline structure can be recognized.

This species consists of:—

Sulphuric acid	37.021
Oxyd of alumina	10.896
Magnesia	6.750
Soda	1.289
Water	44.952
	100.908

Consequently we again have a composition of alum, magnesia and the sulphate of magnesia and soda.

J.

This substance is presented under the form of yellowish white pieces of a crystalline structure, with acicular inside crystals of a silky lustre. The quantity of oxyd of alumina corresponds to that of H, as the following result demonstrates:—

Sulphuric acid	36.648
Oxyd of alumina	11.698
Magnesia	5.834
Soda	1.384
Water	43.816
	99.380

The two substances H and J, contain very small quantities of chlorine.

K.

The last of the substances which I have studied, comes from a place called *Alumbrera*, a very general name here. This is the

land crossed by the streams which come from the West and unite in the river *Andalgala*. I never went as far as these streams, but only to the *Portezuelo de Yutiyacu*, on an excursion to *Campo Grande*, which is situated at a hight of more than 10,000 feet. Thence I could contemplate the valley where there is a torrent, whose noise is heard at *Portezuelo*.

The mountain of *Campo Grande* is formed of granite, interlaced on the South by minerals of lead, zinc, and iron pyrites.

The veins of this last mineral are also very abundant on the Northern portion of the mountain, in the ravine of *Alumbrera*, and near *Candado*.

The sulphate under consideration probably comes from thence. If the latest news are to be believed trachyte also exists there, although it is completely wanting in the Southern part.

The sulphate K, is a stalactite of a laminated and crystalline tructure. The cavities are lined with yellow-ochre.

The result of my analysis gives:—

Sulphuric acid	36.577
Oxyd of alumina	11.185
Oxyd of iron.....	3.390
Magnesia.....	2.576
Soda.....	0.568
Water.....	45.671
	99.967

In the manual of Gmelin, vol. III, p. 222, the analysis of various natural sulphates of iron is found; viz., of the Styplicita of *Coquimbo*, and the Mysis of *Goslar*.

The two last contain sulphate of magnesia to which the 7 ordinary molecules of water have been attributed, whilst for the sulphates of iron the following formulas are met with:—

$$Fe^2 O^3 . 2 SO^3 + 10 HO.$$
$$2Fe^2 O^3 . 5 SO^3 + 18 HO.$$
$$2Fe^2 O^3 . 5 SO^3 + 10 HO.$$

The sulphate of magnesia does not contain a constant quantity of water; therefore the formula of the Kiescrita is Mg O. $S O^3$ + 1 $H^2 O$; that composed of magnesia and potash holds 6 equivalents of water; that of magnesia and soda—the Astrackanita--contains 4 and the Löwita only $^5/_2$.

In the presence of such a difference I believe it may be said that the quantity of water in the sulphates of alumina and the oxyd of iron is constant, but variable in magnesia whether combined with other sulphates or alone.

Admiting this theory, the composition of the substance K, would be:—

Sulphate of oxyd of alumina....	$Al^2 O^3 = 11.185$	
$Al^2O^3 . 3SO^3 + 18$ HO.....	$3SO^3 = 26.062$	72.431
	$18HO = 35.184$	
Sulphate of the oxyd of iron....	$Fe^2O^3 = 3.390$	
$Fe^2O^3 . 3SO^3 + 18$ HO.....	$3SO^3 = 5.085$	15.340
	$18HO = 6.865$	
Magnesia.....	2.576	
Soda.....	0.568	8.574 *
Sulphuric acid....	5.430	
Water.....	3.622	
	99.967	

I have just demonstrated, that sulphates exist in our country whose origin can be explained in two ways.

Either they come from the oxidation of the sulphate of iron, first transformed into the sulphate of ferreous oxyd, then into the sulphate of ferric oxyd; and then the sulphuric acid already free, would combine with the elements of the minerals; or else, these sulphates are the product of a direct action upon the minerals—particularly the volcanic ones—as Mr. Boussingault has demonstrated; then a process of slow lixiviation would carry the product to the surface.

As I said at the beginning of this chapter, the rains of summer wash down the minerals of our mountains, and the rivers carry their turbid waters to the low basins of the salt-deposits, where they dry during the winter.

The different salts are elevated by capillarity and from efflorescences. The contact of the saline solutions with the soil produces a decomposition of the salts themselves, and the carbonate —and probably also the silicate—of lime is transformed into chalk. Moreover, these phenomena give origin to alumina, the silicate of alumina, the oxyd of iron, the silicate of the oxyd of iron, and to the carbonate and bicarbonate of ferreous oxyd.

Some earths formed of sediment similar to that under consideration, in effect, contain the bicarbonate of ferreous oxyd. Inasmuch as potash possesses the property of forming zeolites—so important to vegetation because the ground easily absorbs them—it is to be supposed that the salt of the deposits contains only a

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* The calculation:—

$MgO . SO^3$	= 7.728
$Na^2 O . SO^3$	— 1.211
	8.939

little potash. In truth I have only found its traces. (*Vide, Bulletin de l'Acad. l. c.)*

I believe I have thus explained the formation of the salt-deposits, and the presence of chalk. According to Otto, this explanation had not been previously made (*vide* the last ed. of his *Manual*, Vol. II, p. 267); but it is not only the absorption of the soil which determines a change in the primitive salts. The temperature at which the water is evaporated, also merits our áttention; in effect, the water determines whether the sulphate of soda and the chlorid of magnesia in dissolution, will present this combination, or be converted into sulphate of magnesia and common salt.

If the salt-deposit is lower than the surrounding soil—as happens in that of *Campo de Andalgala*—it must be admitted that the rain-waters will flow into the basin. Therefore, when the water has evaporated, we observe in the crusts of salt the same phenomena as in those of mud.

Moreover, it may be supposed that a part of the water which penetrates the grouud at the most elevated points, finds its way to the basin, and is evaporated through the stratum of salt.

The quantity of this will gradually augment, and capillary action will be continuous.

According to these explanations, we can represent these relations by means of Fig. 3.

Putting aside the strata of salt of primitive formation, let us only consider the basin which is converted into a small lake, such as the *Laguna-blanca* and the *Laguna-colorada*, which appear to receive their salts from the volcanic minerals of the Cordilleras. During the winter these lakes lose a great part of their waters, and the banks of salt are formed upon their shores, in which is also produced capillary attraction, whilst in the center a reduction is effected in conformity to its state of liquidity and temperature.

T hese phenomena—the transportof salts, their reduction and decomposition accordiug to the coefficients of capillarity, solubility nd surrounding temperature—may last several centuries, when a deposit of salt is formed like that of Stassfurth.

CHAPTER XIII.

MINERAL WATERS.*

THE Argentine Republic, situated in a more-or-less volcanic territory, possesses a considerable wealth in alcaline salts in almost all of its Provinces. It may also be deduced from the following data, that many saline-waters and medicinal-springs or Spas are to be found, both cold and thermal, of different component parts, such as exist in all countries situated in identical conditions. Martin de Moussy in his voluminous work on our Republic, mentions the greater part of these Spas then known, but he says nothing about their composition or of their practical or medicinal application; which indeed he could not do, because no chemical analysis upon this subject was published prior to 1859. Attention has recently been paid to this important point, especially in reference to the most notable springs. The following pages report the principal results.

As may be imagined from the volcanic origin of the most elevated portions of this country, the greatest number of these springs are sulphurous; above all, those of the Andean Provinces. On account of the peculiar odor which characterizes their waters, they have been the first to attract the attention of the inhabitants of those regions, whilst others of more importance have not been appreciated, save where distinguished by an elevated temperature or a disagreable taste.

In the Province of Córdoba, at the center of our Republic, no mineral springs of importance have been found: the same may be said—if certain lagunes of common salt-water be excepted—of the Provinces of Santa-Fé, Entre-Rios and Buenos-Aires. Those of the other Provinces are principally sulphated waters and springs of common salt-water. Rarely have they been found acidulated—

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* By Professor Max Siewert, Sc. Dr.

like Selters water—not even by iron, although a great number of them are fouud, where at least, there are very extensive strata of iron-ore.

On the other hand, analysis has discovered a new species of spring, to which may be given the name of silicates *(Kieselquellen)*. To the present time only one of this species was known; the *Geysers* of hot-water in Iceland. These springs contain such a considerable amount of silicic acid, that after evaporation a gelatinous substance is deposited, the exact analysis of which shows, that as high as $\frac{1}{8}$ of the solids is composed of this substance, so little soluble in water.

Salt-springs (Chloride of sodium).

To this class belong the waters of the:—

1. *River Salado*, Province of Santiago del Estero.
2. *Bridge of the Inca*, Province of Mendoza.
3. *Baths of Albardon*, „ „ San Juan.
4. *Salt-baths*, of the ponds of the interior of the Province of San Juan.
5. *River Papagayos*, Province of San Juan.
6) *Paraiso*, Province of Salta.
7. *Rosario on the Frontiers, No. II.* Province of Salta.

Some of these waters also contain a certain portion of sulphates, but no combinations of iodid or of bromate, are found in any of them. The opinion of M. de Moussy that these two ingredients, so important for the cure of the gout, are found in the water of a spring in the hills of *Angasta*, Province of Catamarca, has not been verified.

Sulphurous-springs.

To this class belong the following:—

1. *In the ravine of Guaco*, Province of San Juan.
2. *River of Papagayos*, „ „ „
3. *Baths of Albardon*, „ „ „
4. *Baths of Loja*, „ „ „
5. *Ravine of Villa Vicencio*, „ Mendoza.
6. *Rosario of the Frontiers, No. I.* Province of Salta.
7. *On the interval of Rio-Hondo*, „ Santiago.

A large number of these springs also contain much common-salt, to which substance is certainly due their peculiar qualities.

Sulphate-springs.

Spas of pure sulphate-water are not easily found, as the greatest number are springs of common salt-water, because they con

tain such an enormous quantity of this substance. Nevertheless, their medical properties ought to be attributed to sulphuric-acid in such among them as contain more of this, than of chlorid; or at least, in those in which the proportions of each ingredient do not differ much. Among the springs of sulphate-waters, the following without doubt, may be named:—

1. *Albardon*, Province of San Juan.
2. *Capi*, near San Cárlos, Province of Mendoza.
3. *Borbollon*, Province of Mendoza.
4. *Baths of Los Reyes*, Province of Jujuí.

Acidulated-springs.

This class of mineral Spas which is principally characterized by the great quantity of carbonic-acid in dissolution in their waters, due to the great pressure they undergo in the interior of the —earth, and which escapes by bubbling on reaching the surface— ought to be divided into three different species; viz., *a*, the alcaline; *b*, the terreous: and *c*, the ferruginous.

a. The acidulated-alkaline.

To this species belong the following:—

1. *Fiambalao*, Province of Catamarca.
2. *Valley of Gualfin*, Province of Catamarca.
3. *Rosario of the Frontiers, N°. III*, Province of Salta.
4. *Paraiso*, Province of Salta.

b. Acidulated-terreous (or calcareous).

These are sufficiently numerous, as may well be understood from the great number of calcareous strata which are even formed at present. The most important of this group are the following:—

1. *Bridge of the Inca*, Andes. Province of Mendoza.
2. *Baths of Alto and Bajo*, „ San Juan.
3. *Ravine of Los Hornos*, in the alluvium, Province of Catamarca.

c. The acidulated-ferruginous.

According to Martin de Moussy, springs of this class are found in the Province of San Luis, three leagues from San Francisco, or the road to Palmar.

Silicate-springs.

The Spas which belong to this class, are generally called Zarsa waters; because it is supposed that the water surrounding the

roots of the sarsaparilla, may have carried away the medicinal substance of this plant, These springs generally burst forth in submergible and marshy lands; they hold a strong smell of hydrosulphuric acid, and also a weak solution of aniline. By evaporation with hydrochloric-acid, or without it, the residue which has not completely lost the water, is converted into a gelatinous substance.

The curative properties of these waters have not yet been studied, because no springs of this class exist in Europe. On the other hand the indigenes exaggerate their medical importance, by making use of them in all venereal and skin-diseases.

To this class appertain the following:—

1. The cold springs of the *Baths of Los Reyes*, Province of Jujui.
2. Those of *Rosario of the Frontier*, Province of Salta.

The ensuing information on the composition of these different waters refers to 1 litre, or 1000 cubic centimetres; and the quantities of the ingredients are expressed in grammes.

Salt-springs and deposits.

On commencing the description of the waters characteristic of our country, by those which are most generalized or of the greater importance, we have an opportunity at the same time of calling attention to the immense wealth it possesses in common-salt, as well as in other alkaline salts. In the succeeding table (page 241) we have placed in the first rank the waters of the *River Salado*, in the Province of Santiago del Estero. This river rises in the North of the Province of Tucumán, and is one of the largest in the Interior, because it has a great number of small confluents which empty into it; but it loses its rapidity to the South of the city of Santiago, where it enters on the great level of the Pampean Formation. Some twenty years ago it abandoned its former bed, on account of a heavy-freshet in summer, and entered a salt-deposit to the Westward. After having formed there various lagunes or small-lakes, it abandoned the salt-district. But meantime its waters had dissolved a considerable quantity of the salt, so that its name has been changed from River *Dulce*—sweet—to that of River *Salado*—salt—. Its waters contain so much salt, that with little expense and in a few days, simply by evaporation, enough salt could be obtained for the yearly consumption of the whole population of the country. The observations taken at the bridge on the post-route, have demonstrated that the quantity of salt annually transported by the river, amounts to 145,000 quintals.

1000 c.c. of this water contain in solid ingredients:

Sulphate of lime.....	5,9890	grms.
Sulphate of magnesia...	1,2430	„
Chlorid of magnesium..	0,7950	„
Chlorid of sodium.....	100,2260	„
Total....	108,2530	„

Consequently, there is more than 10 % of common-salt in the waters of this river; but, inasmuch as many deposits and dry strata of this salt exist in different parts of the country, no one has taken the trouble to exploit these riches. The following analyses were only wanting to prove the great value of these natural deposits which are formed by the evaporation of the water which runs down from the forests to the valleys.

The calculations are made in the proportion of 1 to 100.

Localities	Sand	Sulphate of lime	Chlorid of calcium	Chlorid of magnesium	Sulphate of potash	Chlorid of potassium	Chlorid of sodium
Salt-deposits of *Laguna-Blanca* (Catamarca).....	1,50	0,56	1,28	0,18	—	0,88	95,62
„ „ *San José* (Córdoba)...	—	3,59	—	0,67	4,04	—	91,90
„ „ *Huanacache* (Mendoza)	—	3,91	2,27	2,19	—	1,68	89,95
„ „ *Andalgala*, ó *Belen* (Catamarca).....	—	8,09	—	0,69	—	2,40	85,82

The salt of the Puna—Province of Jujuí—which is generally used in the Provinces of the North, is almost the same as that of the *Laguna-Blanca*, the only difference being that the chlorid of magnesium exceeds the chlorid of calcium, in quantity.

Although salt-deposits or lakes, are spread over all the Provinces of the Republic, formed by salt-springs or rivers, there is no want of fresh-water. As a general rule all the rivers are of fresh-water, which contains only a small quantity of mineral-matter, and is remarkable for its almost complete lack of organic substances. The analyses of the waters of the various Provinces, prove that they are almost of the same composition: and yet, when it is remembered that the Formation of the mountains is also the same in all parts, and that the rivers run with considerable rapidity, it is not astonishing that the waters bring down only a small portion of earthy-matter, which is always the same.

I cite two examples:—

1,000 c.c. of water contain:

	Rio de Arias (Salta)	*Rio Primero* (Córdoba)
Silicic acid	grms. 0,0147	0,0134 grms.
Argillaceous earth	—	0,0017 „
Sulphate of potash	„ 0,0097	0,0163 „
Sulphate of lime	„ 0,0097	—
Bicarbonate of lime	„ 0,0895	0,1046 „
Bicarbonate of magnesia	„ 0,0403	0,0310 „
Bicarbonate of iron	„ 0,0024	0,0180 „
Bicarbonate of soda	—	0,0286 „
Chlorid of sodium	„ 0,0058	0,0164 „
Total	„ 0,1776	0,2300 „
Free carbonic-acid	„ —	0,0439 „

Inasmuch as the River *Arias*, at the city of Salta, has hardly commenced its course, the water of the neighboring mountains resulting from atmospheric precipitation, has not had time to dissolve as much mineral substances as the River *Primero* contains, when passing by Cordoba after a long course.

It is the general custom here to employ only the running-water, because the water of the city-wells is totally infected, and entirely unserviceable, owing to those salts which are produced by the decomposition of fecal-matter and organic substances, and render it noxious to health. For example, I here cite the analysis of the water of two wells, one in Córdoba and the other in Salta.

1000 c. c. of this water contain:—

	Córdoba.	Salta.
Silicic acid	grms. 0,0388	0,0448 grms.
Argillaceous earth	„ 0,0005	—
Oxyd of iron	„ 0,0016	0,0064 „
Sulphate of potash	„ 0,0524	0,0337 „
Sulphate of lime	„ 0,0131	0,2337 „
Carbonate of lime	„ 0,1796	0,0586 „
Carbonate of magnesia	„ 0,0576	0,3323 „
Nitrate of lime	„ 0,0764	0,6396 „
Nitrate of soda	„ 0,0908	—
Chlorid of calcium	—	0,1320 „
Chlorid of sodium	„ 0,0865	0,4084 „
Soda allied with organic substance	„ 0,0093	—
Total	„ 0,6066	1,8895 „
Free carbonic-acid	„ 0,1152	0,3165 „

As an exemple of the *thermæ*, or hot-springs of pure-salt, we cite here the mineral water of *Rosario of the Frontier*, N° II, Province of Salta, because the other springs of common-salt should be considered as appertaining to a different class of medicinal Spas. from the quantity of sulphates and sulphurated hydrogen which they contain.

The water of *Rosario of the Frontier*, N° II, to which the ensuing analysis refers, differs but little from the water of the Ocean, so far as regards its solid substances, and therefore ought to exercise the same physiological action upon the human organism. The principal difference consists in the absence of chlorid of magnesium, of calcium, and of the combinations of iodine and bromine. Moreover, the water of this Spa has the excessive temperature of 81° C.

1,000 c. c. contain:—

Silicic acid.....	0,0700	grms.
Sulphate of potash.....	1,6035	„
Sulphate of soda.....	0,2094	„
Sulphate of lime.....	0,7940	„
Bicarbonate of magnesia.	0,1285	„
Bicarbonate of iron.....	0,0320	„
Bicarbonate of lime.....	0,0106	„
Chlorid of sodium.....	23,7380	„
Organic substances.....	0,1213	„
Total..	26,9408	„

It is a curious fact that this spring, containing such a considerable quantity of organic substances, does not present even a trace of free carbonic-acid.

As the greater part of the waters already mentioned—remarkable for the proportionally great quantity of common-salt—do not exercise over the organism the same influence as the sulphates, sulphurets and bicarbonates, it is necessary to group them among similar mineral-waters, according to their principal substance in a medical point of view.

These sulphurated-waters, are only surpassed in abundance by the salt-springs. The former are called here, the Fetid-waters.

The Province of San Juan possesses the greater part of the sulphureted-waters known at present. We will therefore mention them first.

Sulphureted-springs, in the Province of San Juan.

The ravine of Huaco.

This Spa at the temperature of 24, 5° C. is found in a fissure of the paleozoic calcareous stone of *Guaco*—or *Huaco*—on the

right of the road to the North of *Jachal*, and is specially called the Fetid-waters on account of its pestiferous vapor, which is perceived at a great distance. At the spot where the spring appears, a calcareous rock is found of a gross crystalline structure, containing pure and white calcareous spar of a violet-color. The water is perfectly crystalline. and is received in a natural basin situated at a considerable hight, from whence it flows into another smaller receptacle ; thence in a streamlet, it takes its course through the narrow valley. The waters become turbid on their way, and deposit a slight layer of sulphur.

This spring is used for baths.

1,000 c. c. of its water contain:—

Silicic acid.....	0,0150	grms.
Sulphate of potash	0,1582	„
Sulphate of lime.....	0,7297	„
Bicarbonate of lime	0,1017	„
Bicarbonate of magnesia.	0,5328	„
Bicarbonate of iron.....	0,0110	„
Bicarbonate of soda	0,1003	„
Sulphuret of sodium	0,1443	„
Chlorid of sodium.....	1,7082	„
Total..	3,5012	„
Free carbonic-acid.....	0,1630	„

River of Papagayos.

1000 c. c. contain:—

Sulphate of potash.....	0,1000	grms.
Sulphate of soda	1,4338	„
Sulphate of lime.....	2,5014	„
Sulphate of magnesia....	0,1652	„
Bicarbonate of soda.....	0,0149	„
Sulphuret of sodium....	0,0371	„
Chlorid of sodium.....	4,9411	„
Total..	9,1847	„
Free carbonic-acid	0,2783	„

The water of this little fount refreshes the traveller more by its aspect than by its use, because it is a complete deception. When a small drink—above all in summer—has been taken, its purgative effects are rapid. The circumstance that one half of its solid matter consists of sulphates, and the other half of chlorid of sodium, is explained by its proximity to the great salt-deposits, on the limits of the Provinces of San Juan and Rioja. The solutions

of salt which have formed these beds, have deposited by evaporation the sulphureted ingredients near the edges, whilst the sediment of pure common-salt has formed nearer the center.

Nevertheless, this little Spa is very interesting, not from the cathartic power of its water but on account of its locality, to which is doubtless due the considerable quantity of sulphurous combinations, and of carbonic-acid which they contain. This region may become some day of great importance to the development of the Republic; and it is to be regretted that M. de Moussy has made a very inexact sketch of this part of the Province of San Juan, particularly of the crests of the mountains of *La Huerta*, of *Valle-fértil*, of *Higueritas*, and of *Marayes*. This is the only portion of the entire territory of the Argentine Republic, where true *Mineral-coal* has been discovered.

According to the geological formation of this valley, it ought to contain mineral-coal throughout its whole extent. But up to the present, experience has not demonstrated that these coals are of equal quality to those found abroad. Their analysis gives the following result, in 100 parts :—

Samples.	I.	II.	III.	IV.
Water.....	6,7	8,6	6,9	1,6
Ash.....	29,9	14,3	18,6	33,4
Combustible substance.....	63,4	77,1	74,5	65,0

100 parts of these coals dried in the air, gave by dry distillation :—

Samples.	I.	II.	III.	IV.
Water.....	8,75	13,3	10,3	4,6
Tar.....	1,25	2,3	3,5	9,2
Ash and coke.....	74,04	72,5	69,0	77,1
Gas (lost).....	15,96	21,9	27,2	9,1

Samples I and III did not melt, nor did they form a spongy mass of coke. The gaseous-water contained a considerable quantity of ammoniacal combinations. Sample IV, produced the least gas, but of a superior quality. This coal melted and produced

excellent coke. The ash of the four specimens was more or less the same, being composed of argillaceous and calcareous earths—sometimes replaced by oxyd of iron—and of silicates, with from 50 to 64.4 % of silicic-acid.

Salt-Baths of Albardon.

1000 c. c. of this water contain:—

Silicic acid.....	0,0800	grms.
Sulphate of potash.....	0,3527	„
Sulphate of soda	13,5193	„
„ „ lime.....	2,0400	„
„ „ magnesia....	2,4948	„
Bicarbonate of iron.....	0,0246	„
„ „ soda.....	0,0150	„
Sulphuret of sodium....	0,1450	„
Chlorid of sodium.....	10,3545	„
Total..	29,0253	„
Free carbonic-acid	1,2584	„

On account of the quantity of sulphate of soda and of common-salt which it contains, this Spa is only fit for baths. Its temperature is about that of the blood—38° C.; it is much frequented, whether by those who reside in cabins alongside, or come from the pretty hamlet of *Albardon*. The environs are swampy, but dry up during the summer, the water leaving abundant concretions on the plants and soil.

The analysis of these concretions gives:—

Sulphate of lime.....	5.00	per 100
» „ magnesia....	6.20	„ „
« „ potash.....	11.48	„ „
„ „ soda	69.45	„ „
Chlorid of sodium.....	7.87	„ „
Total..	100.00	„ „

Baths of La Loja.

(Near the city of San Juan)

The wide valley situated between the high-land of *Villicum*, composed of calcareous rock—paleozoic and dolomite—and the mountain ridge of *Pié-palo*—of exquisite primitive crystalline formation—is based upon a soft sandstone covered with limestone and loose dolomite. At the distance of half a league from the grazing farm of *Salado de la Loja*, the spring is found between banks of decomposed calcareous stone. It is divided into upper

and lower forests, or *upper and lower baths.* The first is formed by two natural receptacles of limestone, situated one near the other, of the diameter of two metres. The second is situated immediately at the foot of a conical eminence 25 metres in hight, formed of horizontal calcareous strata. This Spa bursts forth by an aperture two metres in diameter, the edges of which are continually elevated, by the new quantities of lime which the water precipitates.

The temperature—75° C.—and the chemical composition of the two waters, are in all respects identical. Notwithstanding the district is a complete desert, these baths are much used for rheumatism, and for venereal and skin-diseases.

1000 c.c. contain:—

Sulphate of potash.....	0,6162	grms.
« „ lime	1,4338	„
Bicarbonate of lime.....	0,2901	„
Sulphuret of calcium	0,1890	„
Chlorid of magnesia	0,5558	„
Chlorid of sodium	4,6443	„
Total..	7,7292	„
Free carbonic-acid.....	1,1276	„

Salt-Baths of La Loja.

Half a league distant from the preceding springs, between the two small banks of the bed of the ancient river *Seco*, small quantities of stagnant-water are found. A stream which comes down by a narrow-vale from the high-land of *Vallicum*, is lost in the sand on arriving at the plain, and after having perforated the sand-stone, reappears in this favorable locality.

1000 c. c. of this water contain:

Silicic acid.....	0,0180	grms.
Sulphate of potash.....	0,2993	„
„ „ soda.....	2,3838	„
„ „ lime	0,2817	„
Bicarbonate of lime.....	0,6922	„
Chlorid of magnesia.....	1,5275	„
Chlorid of sodium.:....	5,3281	„
Total..	10,5306	„
Free carbonic acid.....	0,0236	„

Sulphureted-springs of the Province of Mendoza.

Villa-Vicencio

At half an hour's march, on the road which leads from Mendoza

to Chile by the Uspallata pass, in the narrow-fissure of a rock formed of argillaceous schist, a small fountain springs forth at 10 metres above the level of the stream which runs through the valley. Its temperature is 36.5° C. The waters are collected in a small natural receptacle on descending from the rock, from whence they run into a second basin. Thence they flow to a bed three paces distant. The water in the second receptacle still preserves the temperature of 34.5° C., whilst in the stream it has only 18° C. Already, baths of primitive construction are prepared here.

1000 c. c. contain:—

Silicic acid.....	0,0258	grms.
Sulphate of potash.....	0,0618	„
„ „ lime	0,0466	„
„ „ magnesia	0,0103	„
Bicarbonate of magnesia .	0,0237	„
„ „ iron.....	0,0131	„
„ „ soda	0,8174	„
Sulphuret of sodium....	0,2132	„
Chlorid of sodium.....	0,1170	„
Total..	1,3289	„
Free carbonic acid.....	0,0356	„

This water is also used as an internal medicine.

Sulphureted-springs in the Province of Salta.

Of the four Spas in the same locality—*Rosario of the Frontiers* —only N°. I contains any considerable quantity of sulphureted hydrogen in combination; N°s III and IV, hold such a reduced amount, as hardly to entitle them to be classed among the sulphureted waters. They are distant two leagues to the East of the town of *Rosario of the Frontiers*, in a small triangular indentation on the crest of the mountain. The entrance to this little valley is rather rustic, so that it is only possible to approximate in a carriage to within 500 paces. The springs meet at last, thus forming a larger current which is emptied into the River Rosario.

Close to this valley on the Southern slope, in a small crevice, the largest mineral branches of N°. II, as well as the sulphureted Spa N°. I, bubble forth. The first is the most accessible because it runs at the bottom of the valley, and at a temperature of 81° C.; whilst the other, whose temperature is 80° C. is almost inaccessible, because it is on the top of the mountain, in very broken land. At the distance of about 100 paces from these Spas on the Southern water-shed of the mountain, a stream of fresh-water is found under the same name of *Agua-Dulce,* whose temperature

is 63° C.; this stream is precipitated into the valley at the confluence of the three Spas, and the cold current of *Sarsa* water, penetrating through a swamp covered with bushes, accompanies and gradually modifies the temperature of the waters. From this it results that, following the course of this stream, a bath can be taken at any desirable temperature.

Notwithstanding the springs Nos I, II and IV, as well as the cold baths of *Los Reyes* in the Province of Jujuí, contain such a considerable quantity of silicic-acid in dissolution, that they could be classified also among the silicic Spas, nevertheless, the relative abundance of sulphureted hydrogen, approximates them still more to the sulphureted-springs.

Rosario of the Frontiers.

1000 c. c. of its water contain:—

Silicic acid.....	0,0906	grms.
Sulphate of potash	0,0502	„
„ „ soda.....	0,0823	„
„ „ lime	0,0306	„
Bicarbonate of lime.....	0,0174	„
„ „ magnesia	0,0104	„
„ „ iron.....	0,0088	„
„ „ soda....	0,1857	„
Sulphuret of sodium ..	0,0250	„
Chlorid of sodium.....	0,7161	„
Total..	1,2272	„
Free carbonic-acid.....	0,0108	„

Sulphate-springs.

The Argentine Republic is not less rich in sulphate-waters and sulphuric-salts, than in common-salt. It is true, that frequently the quantity and the proportion of chlorid of sodium surpasses that of the other salts, but, in all those places where these waters enter salt-districts, a decomposition is generally effectuated during evaporation, owing to the difference in solubility and crystallization of the sulphates and chlorids. As a consequence of this, the sulphates are carried by the waters to a greater distance than the chlorid of sodium or common-salt.

Whilst in the center of a salt-bed the latter substance is represented by 91.90 %, this quantity varies in other localities, as may be seen from the following analysis:—

Localities	Chlorid of sodium	Sulphate of potash	Sulphate of soda	Sulphate of magnesia	Sulphate of lime
Salt-bed on the Eastern edge of the deposit of *Córdoba*, six leagues from *San José*.....	68,00	10,40	11,71	1,08	9,41
Salt-bed between *La Higuera* and *Tuama* or *Sumana*, Province of Santiago del Estero.....	13,53	5,29	78,12	0,12	3,16
Small saline between the high-land of *Los Llanos* and that of *Pié-Palo*, between Rioja and San Juan.....	47,07	14,19	26,52	0,99	11,23
Deposit between the River *Bermejo* (or *San Juan*) and the *Salinita*, North of San Juan	2,41	11,84	80,81	1,27	3,67
Deposit in *Valle Hermoso* and the *Cordillera* of *Los Patos*.....	15,98	6,45	34,77	30,86	11,81
Deposit near *Albardon*, San Juan.....	7,79	11,42	69,39	6,15	4,95

Springs of Capi, near San Carlos.

(Province of Mendoza).

This water whose temperature is of 25° C., merits the name of sulphate-water.

100 c.c. contain:—

Sulphate of soda.....	0,1700	grms.
Sulphate of lime.....	0,0800	„
Chlorid of sodium.....	0,0900	„
Total....	0,3400	„

According to information received, the water of this Spa is very efficacious in all ailments of the stomach and intestines: moreover, it is asserted that by using it to wash clothes, $\frac{3}{4}$ of the usual quantity of soap required is saved, which appears to me improbable, at least under the supposition that the qualitative analysis of Leyboldt is exact.

The waters of Challao and Borbollon.

(Province of Mendoza).

The waters of these two baths, already frequently in use, are exactly alike.

1000 c. c. contain:—

Silicic acid.....	0,0240	grms.
Sulphate of potash	0,0298	„
„ „ soda.....	0,2820	„
„ „ lime	0,3934	„
„ „ magnesia	0,1060	„
Bicarbonate of iron.....	0,0025	„
„ „ soda	0,1988	„
Chlorid of sodium.....	0,1989	„
Total....	1,2354	„
Free carbonic-acid	0,0140	„

In reference to efficacy, these waters are similar to those of *Capi*, although a little stronger owing to the quantity of bicarbonate of soda which they hold; moreover, they are superior to all the other Spas and baths of the country, on account of their picturesque situation and convenient bath-houses, which open upon a beautiful mountain landscape. The constant temperature of these waters is 20° C.

Thermal-springs of the Baths of "Los Reyes."

(Province of Jujui).

The baths situated at three leagues more or less, from the capital of this Province, are both thermal and cold. The first are 36.5° C. in temperature, and contain a considerably greater quantity of salt than the River of *Los Reyes*, where the cold baths are taken.

1000 c. c. of the water of these Spas contain:—

Silicic acid.....	0,0350	grms.
Argillaceous earth	0,0004	„
Sulphate of potash	0,0611	„
Sulphate of soda.....	0,2831	„
Sulphate of lime.....	0,1921	„
Bicarbonate of magnesia...	0,0442	„
„ „ iron	0,0062	„
„ „ soda.....	0,1203	„
Chlorid of sodium	0,0590	„
Organic substances.....	0,0670	„
Total....	0,8684	„
Free carbonic-acid.....	0,0340	„

Acidulated-Waters.

a. Acidulated alkalines.

Spring N°. III, Rosario on the Frontiers.

(Province of Salta).

1000 c. c. of its water contain:—

Silicic acid	0,0512	grms.
Silicic of soda.....	0,0334	„
Sulphate of potash	0,0579	„
„ „ soda.....	0,0639	„
„ „ lime.....	0,0194	„
Bicarbonate of magnesia.	0,0075	„
„ „ iron.....	0,0070	„
„ „ soda	0,2559	„
Sulphuret of sodium.....	0,0016	„
Chlorid of sodium.....	0,1894	„
Organic substances.....	0,0182	„
Total....	0,7093	„
Free carbonic-acid	0,0144	„

The temperature of this Spa is 63° C.; although it has 20° less heat than the other two on the same declivity, none the less does it belong to the true thermal-springs. The surrounding population use it for clothes-washing, for the purpose of economizing soap. The taste of this water is disagreeable enough, on account of the quantity of silicate of soda and hydrated silicic-acid which it contains.

Thermal-springs of Paraiso

(Province of Salta).

This Spa is situated ten leagues from the capital of this Province, in a mountain of calcareous stone, and is one of the most efficacious; above all, because its water whose temperature is from 35° to 38° C., may be employed as an internal medicament. It bubbles forth in a natural opening in the calcareous-stone, of the size of 16 + 10 inches, gradually deepening itself along its length. Nature has formed in this way a natural bath, which serves at the same time both for children and adults; thus affording an opportunity to swim for those who desire it. At the point where the water springs from the deepest part of the Spa, the temperature is a little more elevated than in the shallowest part, whence it flows to the adjacent stream.

For internal use the water is cooled to the surrounding temperature, because the taste of the salt is not then so disagreeable. It is particularly employed in rheumatic affections and those of the intestines.

1000 c. c. contain:—

Silicic acid	0,0260	grms.
Sulphate of potash	0,6209	„
„ „ soda.....	1,7472	„
„ „ lime.....	0,5032	„
Bicarbonate of magnesia.	0,1061	„
„ „ iron.....	0,0030	„
„ „ soda	1,0290	„
Chlorid of sodium,.....	6,0252	„
Organic substances.....	0,0247	„
Total..	10,0852	„
Free carbonic-acid.....	0,0055	„

Valley of Gualfin, near San Fernando.

(Province of Catamarca).

These *thermæ* are not accessible except from the month of May to December. Immediately after the summer rains commence, the neighboring spring overflows into a natural bathing-place; consequently it can only be utilized during the Winter and Spring. On the other hand, inasmuch as these *thermæ* are situated among inaccessible rocks, they are not appropriate for a bathing establishment. When we visited them, they were overflowed; therefore, we were only able to analyse the concretions of salt; their waters contain:—

Chlorid of sodium	13,90 per 100
Sulphate of potash	1,77 „
„ „ soda.....	48,21 „
„ „ magnesia ...	0,18 „
Carbonate of soda	24,37 „
Bicarbonate of soda.....	11,49 „
Total..	99,92 per 100

From the composition of these concretions formed by the precipitation of the salts in evaporation, it can be deduced that these *thermae* belong to the class the alkaline-acidulates.

b. Calcareous-acidulates

Of the Bridge of the Inca, in the Cordillera of Mendoza.

In the valley of the river Mendoza, between the *Inca* bridge and the Cordilleras, the soil is covered in various places by cal-

careous tufa, which is also found on the declivities in the form of strata one metre thick, and also covering like great *mamelones*, some small-hills which rise from the bottom of the valley. The *Inca* bridge is made by a bank of this tufa, undermined by the water which carries along the loosened stones; but the bank resists all friction, and thus the natural bridge has been formed. The solidity of this master-work of Nature is increased by a calcareous spring which spouts at the same point where the bridge is, and continually deposits layers of lime around the only pillar and arch, which is composed of a calcareous bank 50 paces long and 40 paces broad, and is now about 20 metres above the level of the river. There is an enormous quantity of stalagmitic suspended from the center of the arch.

The principal Spa gushes by two equal branches on the right of the pillar at mid-way of its hight, and each one of them enters a small calcareous receptacle formed by nature, sufficiently spacions for a bather. When the water overflows it forms stalagmitic cascades of calcareous-tufa, by precipitation of carbonate of lime.

The temperature of these waters is 33° C. and although whilst leaping over a considerable radius they are clear, they disseminate in the spray a weak odor of carbonic acid. All travelers make use of these baths with facility, because there is a grazing-farm in the neighborhood.

1000 c. c. contain:—

Silicic acid	0,0380	grms.
Argillaceous earth	0,1190	„
Sulphate of potash.....	0,5086	„
„ „ lime.....	2,1284	„
Bicarbonate of lime	1,8993	„
„ „ magnesia .	0,1280	„
„ „ iron.....	0,0532	„
Chlorid of magnesium...	0,1386	„
„ „ sodium.....	11,4644	„
Total..	16,4775	„
Free carbonic acid	0,0549	„

SILICATE-SPRINGS.

Cold Baths of Los Reyes.

(Province of Jujuy).

The water of these baths is of superior quality, inasmuch as it contains a very small quantity of mineral substances. The solid residuum of a litre of water evaporated at 120° C., is hardly 0,0957 gram. This water contains 0,0126 gram. of silicic-acid; that is to say, more than 13 % of an ingredient so little soluble.

1000 c. c. contain:—

Silicate of lime.....	0,0183	grms.
Silicate of soda.....	0,0064	„
Argillaceous earth.....	0,0005	„
Sulphate of potash.....	0,0234	„
„ „ lime.....	0,0083	„
Bicarbonate of lime.....	0,0192	„
„ „ magnesia.	0,0156	„
„ „ iron.....	0,0045	„
„ „ soda.....	0,0042	„
Chlorid of sodium.....	0,0094	„
Organic substances.....	0,0025	„
Total..	0,1123	„
Free carbonic acid.....	0,0103	„

Spring N° IV, at Rosario on the Frontiers, or Sarsa-water.

(Province of Salta).

We have heretofore spoken of the water of this Spa, whilst mentioning the others in this locality, and it only remains for us to call attention to the considerable quantity of silicic acid which is found in it. A litre evaporated at 120° C., only left a residuum of 0,8214 gram. of which 0,0946 gram. were silicic acid; that is to say 11,5 %.

The population of this district attributes great value to this water as favorable to digestion and an excitant of the appetite. Perhaps this activity does not depend on the quantity of silicic acid, but particularly upon the other salts which it contains; viz., sulphate and bicarbonate of soda, not to mention common-salt. Therefore, it would not be improper to classify the water of this Spa among the acidulated alkalines.

1000 c. c. contain:—

Silicic acid.....	0,0786	grms.
„ „ of soda.....	0,0325	„
Argillaceous earth.....	0,0012	„
Sulphate of potash.....	0,0377	„
„ „ soda.....	0,1124	„
„ „ lime.....	0,0256	„
Bicarbonate of magnesia.	0,0164	„
„ „ iron.....	0,0204	„
„ „ soda.....	0,3231	„
Sulphuret of sodium.....	0,0031	„
Chlorid of sodium.....	0,2153	„
Organic substances.....	0,0672	„
Total..	0,9334	„
Free carbonic acid.....	0,0136	„

Owing to the small quantity of sulphuret of sodium and the great quantity of organic substances, this water has a marshy odor, more or less like a weak solution of aniline.

We ought to mention here the following waters which have not been studied as yet.

The *Sulphurous-springs of the high-land of Zonda*, Province of San Juan, which rise in the *Cerro-Blanco*.

The cold-baths of Florida, near San Juan, situated in a picturesque landscape which renders them attractive. This spring precipitates a hydrate of oxide of iron, and consequently, probably belongs to the acidulated-ferruginous class.

The thermal-springs of Pismanta, at 45 leagues to the North of San Juan, and 16 leagues East of *Jachal*. Like those of *La Laja*, they are also sulphurous-waters, and offer more commodities to the sick than these latter: not only are good houses, but also gardens, found here.

The acidulated-calcareous springs of the ravine of Los Hornos, in the Department of *La Hoyada*, Province of Catamarca—which gush from small conical eminences of six feet high.

The thermae of Machigasta, Department of *Arauco*, Province of Rioja, of which to the present, we only know the name.

The adjoined tables I and II include a general resumen of the composition of the waters which have been studied.

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chemical substances

	Fixed Carbonic Acid.	Total Carbonic Acid.	
	CO^2	CO^2	
River Salado, (Pro	—	—	
River de Arias, (F	0,0377	0,0834	
River Primero, (P	0,0500	0,1559	
Ravine of Huaco, (	0,2636	0,7190	
River de los Papag	0,0043	0,2970	
Salt Baths of Alb	0,0034	1,2662	
Baths of los Lagos	0,2115	0,4469	
Baths of la Loja,	0,0915	1,3080	
Borbollon, (Prov	0,0590	0,1320	
Bridge of the Inca	0,6281	1,3330	
Villa Viconcio,	0,2517	0,5411	
Capi (near S. Carl	—	—	
Baths of los Reyes,	0,0110	0,0354	
Id.	0,0484	0,1000	
Rosario of the Fro	0,0609	0,1391	
Id.	0,0550	0,1124	
Id.	0,0770	0,1736	
Id.	0,0990	0,2266	
Baths of Paraiso,	0,3300	0,6838	

TABLE I.

A Litre = 1000 C.C. of the samples of the different waters, contains the following chemical substances expressed in grammes.

Localities.	Specific Weight.	Silicic Acid. $Si0^2$	Alumina. Al^20^3	Oxid of Iron. Fe^20^3	Chlore. Cl	Sulphuric Acid. $S0^3$	Hydro-Sulphuric Acid. H^2S	Fixed Carbonic Acid. $C0^2$	Total Carbonic Acid. $C0^2$	Lime. Ca 0	Magnesia. M_g0	Potash. K^20.	Soda. Na^20	Organic Matter and Water.	Sum Total of the fixed Matters taken at 120° C.
River Salado, (Prov. of Santiago del Estero)	1,07468	—	—	—	61,4150	5,3490	—	—	—	2,4640	0,7488	—	51,1150	—	108,2530
River de Arias, (Prov. of Salta), Fresh Water.....	1,00048	0,0147	—	0,0012	0,0035	0,0131	—	0,0377	0,0834	0,0389	0,0126	0,0087	0,0031	—	0,1335
River Primero, (Prov. of Cordoba), (Id.)	1,00021	0,0134	0,0017	0,0009	0,0099	0,0075	—	0,0500	0,1559	0,0407	0,0097	0,0084	0,0201	—	0,1621
Ravine of Huaco, (Prov. of San Juan), Fetid Water..	1,00308	1,0150	—	0,0050	1,0366	0.5008	0,0629	0,2636	0,7190	0,3400	0,1523	0,0865	1,0617	—	3,2088
River de los Papagayo, (Id.) Region of Stone Coal..	1,00760	—	—	—	2,9891	2,4353	0,0168	0,0043	0,2970	1,0300	0,0551	0,0540	3,2803	—	0,1891
Salt Baths of Albardon, (Id.)	1,02425	0,0800	—	0,0017	6,2835	10,6439	0,0632	0,0034	1,2662	0,8400	0,8316	0,1889	11,5159	—	29,0209
Baths of los Lagos, (Id.)	1,00810	0,0180	—	—	4,3765	1,6463	—	0,2115	0,4469	0,3852	0,6432	0,1617	3,8658	—	10,3191
Baths of la Loja, (Id.)	1,00645	—	—	—	3,2338	1,1261	0,0643	0,0915	1,3080	0,8086	0,2378	0,3329	2,4611	—	7,6406
Borbollon, (Prov. of Mendoza).....	1,00128	0,0240	—	0,0011	0,1207	0,4747	—	0,0590	0,1320	0,1620	0,0353	0,0161	0,3018	—	1,1764
Bridge of the Inca, (Id.)	1,01340	0,0380	0,1190	0,0216	7.0616	1,4858	—	0,6281	1,3330	1,6150	0,0983	0,2748	6,0752	—	15,8275
Villa Vicencio, (Id.)	1,00096	0,0258	—	0,0067	0,0710	0,0562	0,0932	0,2517	0,5411	0,0147	0,0109	0,0334	0,5691	—	1,0753
Capi (near S. Carlos), (Id.)	—	—	—	—	0,0545	0,1429	—	—	—	0,0742	—	—	0,0806	—	0,3400
Baths of los Reyes, (Prov. of Jujuy), Cold Water....	1,00048	0,0126	0,0006	0,0021	0,0057	0,0156	—	0,0110	0,0354	0,0197	0,0049	0,0126	0,0099	0,0025	0,0957
Id. (Id.) Hot Water	1,00096	0,0350	0,0005	0,0031	0,0355	0,3005	—	0,0484	0,1000	0,0791	0,0138	0,0329	0,2046	0,0670	0,8124
Rosario of the Frontier, I Prov. of Salta)	1,00124	0,0906	—	0,0038	0,4345	0,0875	0,0109	0,0609	0,1391	0,0196	0,0032	0,0272	0,5115	0,0102	1,1572
Id. II (Id.)	1,02007	0,0700	—	0,0160	14,5550	1,3223	—	0,0550	0,1124	0,4858	0,0402	0,8663	12,6709	0,1213	26,8664
Id. III (Id.)	1,00082	0,0676	—	0,0035	0,1150	0,0740	0.0007	0,0770	0,1736	0,0080	0,0023	0,0313	0,2372	0,0182	0,6235
Id. IV (Id.)	1,00099	0,0946	0,0012	0,0102	0,1306	0,0957	0,0014	0,0990	0,2266	0,0105	0,0051	0,0204	0,3157	0,0672	0,8214
Baths of Paraiso, (Id.)	1,00858	0,0260	—	0,0015	3,6565	1,5658	—	0,3300	0,6838	0,2072	0,0332	0,3344	4,3815	0,0247	6,7370

TABLE II.

A Litre = 1000 C.C. of the different waters, contains the following chemical substances combined in salts. The quantities are expressed in grammes.

Localities.	Specific Weight at 19° C.	Temperature Cd	Silicic Acid.	Silicate of Lime.	Silicate of Soda.	Alumine.	Sulphate of Potash.	Sulphate of Soda.	Sulphate of Lime.	Sulphurate of Magnesia.	Bicarbonate of Lime.	Bicarbonate of Magnesia.	Bicarbonate of Iron.	Bicarbonate of Soda.	Sulphurate of Sodium.	Sulphurate of Calcium.	Chlorid of Magnesia.	Chlorid of Sodium.	Organic Matter.	Free Carbonic Acid.	Sum Total of the Salts.
			$Si\ 0^2$	$Ca0\ Si0^2$	$Na^20.\ Si0^2$	Al^20^3	$K^20.S0^3$	$Na^20\ S0^3$	$Ca\ 0.\ S0^3$	$M_g0.So^3$	$Ca0.2C0^2$	$M_g0.\ 2C0^2$	$Fe0.\ 2Co^2$	$Na^20.2C0^2$	Na^2S	$Ca\ S$	$M_g\ Cl^2$	$Na\ Cl^2$		Co^2	
River Salado, (Prov. of Santiago del Estero).....	1,07468	Changeable	—	—	—	—	—	—	5,9890	1,2430	—	—	—	—	—	—	0,7950	100,2260	—	—	108,2530
River de Arias, (Prov. of Salta), Fresh Water.....	1,00048	Id.	0,0147	—	—	—	0,0162	—	0,0097	—	9,0895	0,0403	0,0024	—	—	—	—	0,0058	—	—	0,1776
River Primero, (Prov. of Cordoba), (Id.)	1,00921	Id.	0,0134	—	—	0,0017	0,0163	—	—	—	0,1046	0,0310	0,0180	0,0286	—	—	—	0,0164	—	0,0439	0,2300
Ravine of Huaco, (Prov. of San Juan), Fetid Water..	1,00308	24,5°	0,0150	—	—	—	0,1582	—	0,7297	—	0,1017	0,5328	0,0110	0,1003	0,1443	—	—	1,7082	—	0,1630	3,5012
River de los Papagayos, (Id.) Region of Stone Coal..	1,00760	Changeable	—	—	—	—	0,1000	1,4338	2,5014	0,1652	—	—	—	0,0149	0,0371	—	—	4,9411	—	0,2783	9,1847
Salt Baths of Albardon, (Id.)	1,02425	38°	0,0800	—	—	—	0,3527	13,5193	2,0400	2,4948	—	—	0,0246	0,0150	0,1450	—	—	10,3545	—	1,2584	29,0253
Baths of los Lagos, (Id.)	1,00810	—	0,0180	—	—	—	0,2993	2,3838	0,2817	—	0,6922	—	—	—	—	—	1,5275	5,3281	—	0,0236	10,5306
Baths of la Loja, (Id.)	1,00645	25°	—	—	—	—	0,6162	—	1,4338	—	0,2901	—	—	—	—	0,1890	0,5558	4,6443	—	1,1276	7,7292
Borbollon, (Prov. of Mendoza)	1,00128	24°	0,0240	—	—	—	0,0298	0,2820	0,3934	0,1060	—	—	0,0025	0,1988	—	—	—	0,1989	—	0,0140	1,2354
Bridge of the Inca, (Id.)	1,01340	33°	0,0380	—	—	0,1190	0,5086	—	2,1284	—	1,8993	0,1280	0,0532	—	—	—	0,1386	11,4644	—	0,0549	16,4775
Villa Vicencio, (Id.)	1,00096	36,5°	0,0258	—	—	—	0,0618	—	0,0466	0,0103	—	0,0237	0,0131	0,8174	0,2132	—	—	0,1170	—	0,0356	1,3289
Capi (near S. Carlos), (Id.)	—	25°	—	—	—	—	—	0,1700	0,0800	—	—	—	—	—	—	—	—	0,0900	—	—	0,3400
Baths of los Reyes, (Prov. of Jujuy), Cold Water....	1,00048	Changeable	—	0,0183	0,0064	0,0005	0,0234	—	0,0083	—	0,0192	0,0156	0,0045	0,0042	—	—	—	0,0094	0,0025	0,0103	0,1123
Baths of los Reyes, (Id.) Hot Water....	1,00096	Id.	0,0350	—	—	0,0004	0,0611	0,2831	0,1921	—	—	0,0442	0,0062	0,1203	—	—	—	0,0590	0,0670	0,0340	0,8684
Rosario of the Frontiers, N° *I* (Prov. of Salta)	1,00124	80°	0,0906	—	—	—	0,0502	0,0823	0,0306	—	0,0174	0,0104	0,0088	0,1857	0,0250	—	—	0,7161	0,0102	0,0108	1,2272
Id. *II* (Id.)	1,02007	81°	0,0700	—	—	—	1,6035	0,2094	0,7940	—	0,0106	0,1285	0,0320	—	—	—	—	23,7380	0,1213	—	26,9408
Id. *III* (Id.)	1,00082	63°	0,0512	—	0,0334	—	0,0579	0,0639	0,0194	—	—	0,0075	0,0070	0,2559	0,0016	—	—	0,1894	0,0182	0,0144	0,7093
Id. *IV* (Id.)	1,00099	Changeable	0,0786	—	0,0325	0,0012	0,0377	0,1124	0,0256	—	—	0,0164	0,0204	0,3231	0,0031	—	—	0,2153	0,0672	0,0136	0,9334
Baths of Paraiso, (Id.)	1,00858	35-38°	0,0260	—	—	—	0,6209	1,7472	0,5032	—	—	0,1061	0,0030	1,0290	—	—	—	6,0252	0,0247	0,0055	10,0852

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CHAPTER XIV.

TANNING MATERIALS.*

CHEMICAL ANALYSIS OF THE ASHES.

THE manufacture of sugar from cane—Sp. *caña-dulce*—and the tanning of heavy-leather, are the two principal occupations of the Northern Provinces of our country. The latter, struggles against difficulties unknown in Europe, on account of the climate which frequently causes the putrefaction of the skins during the process of tanning. It is therefore, necessary to abridge as much as possible the duration of the operation. No rational method is followed in the manufacture, which is entirely empirical as yet.

The tanneries of the Old World prefer to employ the bark of the oak, which, although it does not possess a large quantity of tannin, produces an excellent article when the operation has been well conducted. But the oak is not indigenous here and has not yet been imported. The Carob-tree—Sp. *Algarrobo*—which might be called the oak of the country from its slow growth and general aspect, unfortunately does not possess a bark rich in tannin.

Nevertheless, we have the *Cebil* in two varieties; the *red* and the *white*, forming immense forests in the Provinces of Tucumán, Salta and Jujuí, which cover the mountain slopes to a considerable hight. The bark of the red *Cebil* contains more tannin than that of the oak, but it has the unsuitable property of giving a characteristic red-color to the hides, which above all appears when the tanning is completed, and drying commences. This disadvantage having made it desirable to find a tanning material which will

* By Professor Max Siewert, Sc. Dr.

give the customary appearance to the skins, all the trees of our Flora have been submitted to a chemical analysis.

I have separately studied the wood, the bark, and the leaves; and the following table A gives an adequate idea of their tannic importance. I will only add some special information, because these figures speak for themselves.

The Red Cebil.

Experience as well as chemical analysis, teaches us that the adult-tree produces the greatest quantity of tannin, and that when the bark of old-trees is used, the exterior layers—in general the hardest—ought to be rejected.

Notwithstanding my investigations, I cannot affirm that the trees of the plains contain more tannin than those of the mountains. The analysis not giving me constant results, I have been led to believe that the differences which have been frequently met with, are all individual and independent of the composition of the soil.

Experiments, the object of which was to isolate the tannin combined with the lime of the bark by boiling this with carbonate of soda, only gave 1 % of increase (see table A). The quantity of carbonate of soda was calculated from the weight of lime contained in the ashes.

It is remarkable that the wood holds no trace of tannin, whilst the leaves generally give one half the quantity found in the bark.

The White Cebil.

This tree is distinguished from the red *Cebil* by its leaves which are more finely feathered, and by the facility with which its bark dries and ceases to take part in the circulation of the tree. It therefore results that the tannic-acid is quite rapidly decomposed in the exterior of the bark, and becomes oxidized or else withdraws to the interior, according as the bark dries.

The proportion of tannic-acid contained in the exterior or interior parts of the bark is as 1 to 10.

The young trees of the two species of *Cebil* contain almost the same quantity of tannin; their wood contains a little, and the quantity contained in the leaves is somewhat superior to the half of that found in the bark of good quality.

White Quebracho.

(Aspidosperma Quebracho).

The trees which bear this name in the Province of Córdoba, do not belong to the same species as the white *Quebracho* of Salta;

I do not believe that the climate could cause a variety of this tree; in my opinion they are different species.

The leaves of the *Quebracho* of Córdoba are armed at their extremities with small thorns, which the species of Salta does not possess. The form and size of the leaves are alike, although those of the Northern Provinces are thicker. The aspect of the trees is also the same, although the quantity of tannin is very different.

The white *Quebracho* of Salta is very similar to the German oak, and little inferior to the red *Cebil*, whilst its leaves are one of the richest tanning substances in all the Republic, since they contain 27.5 %. Moreover the tannin solution of the bark—as well as that of the leaves—is almost colorless; the red-color of the skin may therefore be prevented, by operating with a mixture of the *Cebil* and the white *Quebracho*.

The Espinillo.

(Acacia cavenia).

This tree is more disseminated in the country than the *Algarrobo*. It attains a greater or less hight according to the nature of the soil, but never surpasses 4 metres. It is recognized by its tender, and finely-feathered leaves, and its numerous thorns and fruit.

The wood and leaves contain but little tannin; the bark, even if it contained more, would not serve for the tannery, because it is too thin, and too difficult to separate from the trunk. The fruit on the contrary, is rich in tannin, and although the seeds contain a very small quantity, the shells contain 33.2 % of pure tannin.

The Algarrobo.

(Prosopis algarrobo)

Black and White.

These two magnificent representatives of the *Mimosa* family thoroughly overspread our country. Unfortunately in the populated districts they will soon disappear, on account of their slow growth, of the small care taken of them, and the complete want of new plantations.

The wood of the *Algarrobo* is of extraordinary strength, therefore it is employed for all purposes.

It is not known why the designations black and white, have been given to the two species. The flowers of both are white; the leaves of the black *Algarrobo* are more finely feathered, and its fruit spotted with black and red, is a little longer and narrower than that of the species called *white*, whose wood is dark-brown,

whilst that of the speciess called *black* is much lighter in color, and almost white in the young trees.

When the aged white-*Algarrobo* with a trunk of more than a foot in diameter, is cut, a black and viscous liquid bitter to the taste, escapes from the vessels nearest the bark; it contains much tannic-acid.

The leaves, the bark and the wood, of the two species of *Algarrobo*, are equally poor in tannin; they are therefore, of no interest to tanners. But their economical importance is great, not only on account of their magnificent timber, but also for their fruit, which is an excellent food for domestic animals and even for man.

A glance at the following analysis will prove this assertion:—

	Fruit of Black Algarrobo	Fruit of White Algarrobo
Water	16,26 %	10,84 %
Greasy-matter	0,26 „	0,43 „
Sugar	37,63 „	25,21 „
Starch	11,24 „	16,71 „
Protein	7,37 „	10,25 „
Cellulose	11,79 „	11,22 „
Organic acids, pectin and non-nitrogenous nutritive substances	14,20 „	23,31 „
Ashes	1,25 „	2,03 „
	100,00 %	100,00 %

The sugar embraced in the fruit is identical to that of the grape and the apple, consequently it is very fermentable; therefore, the country people make an alcoholic, sparkling-drink, from the fruit after macerating it in water, which they call *aloja*. That of the black *Algarrobo* is preferred for this purpose, and the fermentation is caused by the protean substances which it contains.

Here is the composition of the ashes of these fruits:—

	Black Algarrobo	White Algarrobo
Silicate of lime	2,70 %	— %
Silicate of potash	— „	5,84 „
Sulphate of lime	4,23 „	6,82 „
Phosphate of lime	26,20 „	24,92 „
„ „ magnesia	— „	8,70 „
Carbonate of lime	5,14 „	— „
„ „ magnesia	9,30 „	2,73 „
„ „ potash	7,11 „	31,05 „
Chlorate of potash	44,99 „	19,50 „
Oxyd of iron	0,33 „	0,44 „
	100,00 %	100,00 %

The ashes, entirely destitute of soda, manifest such a large quantity of the salts of potash and of the phosphate, as to prove that this fruit is clearly of great importance as food. In several districts of the country it is collected by the population, and it forms their principal nourishment during the Winter.

The Algarrobillo—*Prosopis algarrobillo*—, the wild Walnut—*nogal silvestre*—, the Tipa, the Coco, or Cochuchu—*Xanthoxylum coco*—, the Tala—*Celis tala*—, the Lapacho, the Chañar—*Gourliaca decorticans*—and the Cedar, are only of secondary importance to the tannery.

We will make a special mention, however, of the *Lecheron* and of the *Molles*.

The Lecheron.

In its leaves, its hight and its branches, this tree bears an external resemblance to the willow of Europe, and like it prefers a humid or marshy-soil. Its name, derived from *milk*—Sp. *leche*—is due to its property, when a leaf or branch is cut or broken, of exhuding a species of white-chyle similar to the milky-juice of the *Euphorbia*. The leaves only contain one-third part of the tannic-acid of the bark, and its wood is entirely destitute of it. Although the bark only contains 10 % of tannin, it merits attention because it is without color. The *Lecheron* moreover has the advantage of being widely disseminated, and it grows much more rapidly than the *Cebil*.

The Molles.

In this country a quantity of trees and plants are designated by this name, which do not resemble each other either in appearance or leaves, flowers or fruit, and which in reallity belong to different families. To distinguish them a qualification is added to the generic name which indicates the use; viz., *Molle* to drink, *Molle* to tan, *Molle* for dyeing, etc.

The *Molle á beber—angl.* good for drinking—*Lithræa Gilliesii*—is a handsome tree which is found in the mountainous regions, and is utilized in different ways. The sweet and aromatic fruit is employed—as also an infusion of its leaves—in the manufacture of a refreshing-drink, slightly alcoholic; a species of *aloja*. The leaves contain 0.25 % of colorless tannin; infused in water they serve as a black-dye, as also to prepare a species of ink.

Molle for tanning and dyeing—Sp. *á curtir y á teñir*—species of *Duvana*. This variety contains more tannin than the preceding, and is used both for dyeing and for tanning. To this end the fruit is gathered before its maturity when it is no larger than a grain of vetch, The sprouts of a year, despoiled of their leaves

and of their fruit, do not contain more than 4.6 % of tannic acid-whilst the leaves and fruit contain from 19.2 to 20 %.

It is to be regretted that this variety of the *Molles* does not exceed the hight of 4 meters, and that its leaves are very small. It is therefore, difficult to procure large quantities: nevertheless, were the inhabitants to take the trouble to pick the leaves and the fruit from the dried branches, something could be made out of this rich tanning-substance, especially in view of the fact that it is almost colorless.

Analysis of the ashes.

The soil of the Argentine Republic is almost everywhere saturated with common-salt; therefore, it is interesting to examine whether the vegetation be influenced by the alkalies, in a greater proportion than in those countries destitute of salt.

The quantity of soda much surpassing that of potash in the composition of Argentine soil, it can be foreseen that it will be found in greater portion in the analysis of the ashes of the vegetables; which indeed is the fact.

The chemical composition of most of the vegetables of the old continent, is known. This study has been made either for the purpose of manufacturing potash, or for procuring the best leaves for stable-use, those being preferred which have the most alkali and phosphoric-acid, because these substances augment the value of the manure.

In this country where neither soda nor potash is fabricated as yet, the only object of the analysis of the ashes of the woods of the Interior, is to substitute some chemical products which come from beyond-sea, and to produce an element necessary for the manufacture of soap.

The following tables show the result of my studies on the ashes. They are grouped in couples, of which the first indicates the primitive analytical results, whilst the second presents the probable combinations of the chemical elements (the salts).

TABLE A

Names of the trees	Tannic acid contained in 100 parts of the following substances previously dried in the air.				
	Wood	Bark	Leaves	Fruit	Shells of the fruit without the seeds.
Red-Cebil, young	—	9,20	6,60		
„ „ full-grown	—	13,00			
„ „ old	—	14,40			
„ „ with carbonate of soda	—	15,50			
White-Cebil adult	2,64	8,00	7,30		
„ „ old outside parts	—	1,17			
„ „ inside parts	—	11,84			
White-Quebracho (Córdoba)	0,27	undetermined	0,10		
„ „ (Salta)	—	12,00	27,50		
Red „ „	—	7,41	—		
Flexible-Quebracho (Córdoba)	0,21	—	0,12		
Espinillo	0,56	5,84	0,93	12,03	33,20
Algarrobillo	0,18	undetermined	0,18		
Black-Algarrobo	0,35	2,40	0,22		
White „	0,29	2,64	0,27		
Wild Nogal, angl. *Walnut*	5,00	6,40	2,74		
Young Tipa	—	4,00	2,83		
Old „	—	2,64			
Lecheron	—	9,68	3,33		
Cochuchu	6,13	4,36	—		
Lapacho	1,36	2,72	4,76		
Tala	0,32	undetermined	0,21		
Chañar	0,51		0,55		
Cedar	5,61	6,83	—		
Molle (an infusion to drink)	undetermined		8,55		
Molle (dye stuff)	—		19,2		
Algarrobillo de Guayacán (Salta)	—	4,60	21,11	—	23,2

TABLE B

Names of the trees	Analyses of the ashes of the following woods (in 100 parts).									
	Silicic acid	Oxyd of iron	Chlorine	Sulphuric acid	Phosphoric acid	Carbonic acid	Lime	Magnesia	Potash	Soda
	$Si\,0^2$	$Fe^2\,0^3$	Cl	$S0^3$	$Ph^2\,0^5$	$C0^2$	Ca 0	Mg0.	$K^20.$	$Na^20.$
Red-Cebil	0,61	3,31	1,32	0,57	6,01	35,12	47,67	0,61	4,02	1,61
White „	5,00	0,76	1,02	1,08	4,79	33,88	43,54	0,70	8,38	0,90
„ *Quebracho* (Córdoba)	6,29	6,69	1,09	1,86	6,29	29,89	30,24	4,24	16,70	1,71
„ „ (Salta)	1,04	1,50	2,24	0,67	6,85	32,54	42,36	1,30	9,69	1,81
Flexible „ (Córdoba)	6,69	1,72	0,47	1,03	7,31	29,93	33,33	3,35	15,85	0,32
Espinillo	10,35	0,48	0,13	0,18	2,30	34,88	34,48	1,45	11,00	4,75
Algarrobillo	4,31	0,52	0,39	0,94	3,58	35,17	33,05	1,60	12,37	8,07
Black-Algarrobo	4,71	0,70	1,00	1,38	4,26	33,61	33,82	4,26	12,35	3,81
White „	4,10	0,41	0,31	1,38	3,82	36,56	33,28	7,34	8,96	3,84
Wild Nogal, Angl. *Walnut*	2,14	1,27	1,81	2,37	6,75	27,78	**23,95**	1,19	**28,53**	4,21
Tipa	0,68	0,27	1,05	2,51	**16,28**	21,19	**17,44**	5,27	9,56	0,27
Lecheron	3,24	0,61	2,26	4,26	**15,88**	18,45	**23,70**	4,57	**24,30**	2,73
Lapacho	0,95	2,22	4,50	2,73	**23,62**	10,59	**15,39**	8,00	**28,08**	3,92
Tala	10,99	0,35	1,58	1,37	4,01	30,67	28,71	3,77	15,82	2,73
Chañar	9,43	0,47	0,71	1,17	4,66	32,41	33,43	3,31	9,49	4,92
Cedar	37,52	4,56	0,56	1,26	5,82	18,22	21,54	4,32	5,67	0,56
Cochuchu	2,32	0,65	1,98	0,76	5,56	32,69	37,60	0,25	13,58	4,61
Jume (the whole bush)	3,87	0,64	11,76	5,93	4,07	20,25	**3,90**	0,45	13,19	**38,66**

TABLE C

Names of the trees	100 parts of these woods dried in the air contain.		Salts contained in 100 parts of the ashes of the following woods.											
	Water	Ashes	Silicic acid $Si0^2$	Oxyd of iron Fe^20^3	Common-salt $NaCl$	Sulphate of lime $Ca0.S0^3$	Phosphate of Lime $Ca0^3Ph^20^5$	Carbonate of lime $Ca0.C0^2$	Carbonate of magnesia $Mg0.C0^2$	Phosphate of potash $K^20^3Ph^20^5$	Phosphate of soda $Na^20^3Ph^20^5$	Carbonate of potash $K^20.C0^2$	Carbonate of soda $Na^20.C0^2$	Phosphate of magnesia $Mg\ 0^3Ph^20^5$
Red-Cebil	12,42	3,55	0,62	3,34	2,19	0,98	8,08	76,96	1,44	6,11	0,85	—	—	—
White-Cebil	10,65	3,13	5,00	0,76	1,66	1,86	10,56	66,36	1,47	—	—	12,30	—	—
„ *Quebracho* (Córdoba)	10,50	3,89	6,31	1,70	1,80	3,17	—	51,79	8,94	17,11	1,32	7,86	—	—
„ „ (Salta)	12,15	3,06	1,04	1,50	3,49	1,14	15,04	60,71	2,75	—	—	14,32	—	—
Flexible „ (Córdoba)	12,10	3,15	6,70	1,73	0,60	1,75	—	58,33	7,05	21,86	—	1,97	—	—
Espinillo	12,48	5,71	10,35	0,51	0,20	0,30	—	61,36	3,05	—	5,31	16,14	2,78	—
Algarrobillo	12,50	5,14	4,31	0,52	0,64	1,60	—	57,91	3,35	—	8,26	18,18	5,23	—
Black-Algarrobo	10,80	4,25	4,71	0,69	1,64	2,33	—	58,21	8,91	6,02	5,14	12,45	—	—
White „	11,25	5,02	4,10	0,41	0,52	2,24	—	57,80	15,44	3,27	6,26	9,96	—	—
Wild Nogal, Ang. *Walnut*	12,90	2,05	2,14	1,27	3,02	4,05	—	39,97	2,49	14,16	4,67	28,23	—	—
Tipa	12,46	2,34	0,68	0,27	1,75	4,27	—	28,05	11,11	38,79	7,69	—	7,39	—
Lecheron	12,39	1,41	3,26	0,61	3,74	7,27	6,72	30,67	9,64	36,72	1,37	—	—	—
Lapacho	9,30	1,04	0,94	2,24	7,52	4,69	—	24,28	—	42,59	—	—	—	17,74
Tala	11,80	5,18	10,98	0,44	2,61	2,31	—	49,77	8,00	8,69	2,38	14,82	—	—
Chañar	11,70	3,53	9,43	0,47	1,18	2,01	—	58,31	6,96	4,16	7,58	9,90	—	Silicate of soda. $Na0.Si\ 0^2$
Cedar	11,50	2,60	37,56	4,57	1,00	2,15	6,47	30,64	9,08	8,53	—	—	—	
Cochuchu	12,58	3,94	2,33	0,65	3,28	1,30	—	66,48	0,53	10,06	5,15	10,22	—	
Jume, (the whole bush)	23,19	19,29	—	0,64	19,38	9,50	—	—	0,94	12,15	—	7,50	41,73	7,86

TABLE D

NAMES OF THE TREES	ANALYSES OF THE ASHES OF THE BARKS OF THE FOLLOWING TREES IN 100 PARTS.									
	Silicic acid	Oxyd of Iron	Chlorine	Sulphuric acid	Phosphoric acid	Carbonic acid	Lime	Magnesia	Potash	Soda
	$Si0^2$	Fe^20^3	Cl	$S0^3$	Ph^20^5	$C0^2$	Ca 0	Mg 0	K^20	Na^20
Red Cebil	1,84	0,71	0,26	0,23	3,04	38,98	48,39	0,98	4,05	1,19
White „ exterior..	18,24	3,98	0,26	—	9,51	24,19	39,39	0,19	3,49	0,72
„ „ interior	0,87	1,07	0,26	0,58	3,81	37,94	46,97	0,43	4,61	1,07
„ *Quebracho* (Salta)	2,73	0,66	1,12	0,89	2,33	38,39	32,87	9,21	9,67	2,13
Black-Algarrobo	4,70	0,55	0,67	0,43	0,81	39,66	47,10	1,67	3,84	0,57
White „	2,40	1,54	0,22	0,58	1,27	39,75	44,52	2,50	6,03	1,19
Wild Nogal—ang. Walnut	1,78	0,74	0,37	0,38	1,50	40,27	45,26	2,65	5,77	1,28
Tipa	8,22	0,61	0,47	0,76	1,58	35,99	39,72	5,17	5,97	1,51
Lecheron	16,21	0,66	0,94	3,50	1,55	30,74	26,78	6,59	12,19	0,84
Cochuchu	1,18	0,30	0,84	0,37	1,42	40,14	44,89	2,67	7,48	0,76
Lapacho	2,89	0,35	0,24	0,43	2,21	38,37	40,03	2,67	11,06	1,72

TABLE E

Names of the trees	100 parts of these species of bark, dried in the air contain.		Salts contained in 100 parts of the ashes of the following species of bark.									
	Water	Ashes	Silicic acid $Si\ 0^2$	Oxyd of iron $Fe^2\ 0^3$	Common-Salt $Na\ Cl^2$	Sulphate of lime $Ca0.\ S0^3$	Carbonate of lime $Ca0.\ C0^2$	Phosphate of lime $Ca0^3.\ Ph^2\ 0^5$	Carbonate of magnesia $Mg0.\ C0^2$	Phosphate of potash $K^2 0^3.\ Ph^2\ 0^5$	Phosphate of soda $Na^2 0^3.\ Ph^2\ 0^5$	Carbonate of potash $K^2 0.\ C0^2$
Red-Cebil	12,00	6,85	1,85	0,71	0,44	0,41	86,14	—	2,05	6,11	2,26	—
„ „ exterior	10,00	6,82	18,24	3,98	0,40	—	54,47	16,34	0,42	5,28	0,84	—
White „ interior	11,50	9,74	0,87	1,07	0,43	0,98	83,24	—	0,89	4,04	5,69	2,82
„ *Quebracho* (Salta)	12,58	6,73	2,74	0,66	1,85	1,54	57,75	—	19,13	4,32	2,03	9,98
Black-Algarrobo	6,52	7,70	4,72	0,55	1,10	0,73	83,70	—	3,53	2,43	—	3,26
White „	13,03	9,10	2,40	1,54	0,36	0,98	78,84	—	5,23	1,53	1,76	7,36
Wild Nogal—Ang. Walnut	11,55	8,08	1,78	0,74	0,61	0,64	80,40	—	5,58	2,27	1,70	6,28
Tipa	13,77	11,04	8,22	0,61	0,78	1,29	67,46	—	10,86	2,20	1,95	6,64
Lecheron	12,45	8,30	16,24	0,67	1,55	5,96	43,55	—	13,88	4,60	—	13,54
Cochuchu	11,02	7,10	1,18	0,30	1,41	0,62	79,87	—	5,60	4,24	—	6,78
Lapacho	9,58	7,61	2,89	0,35	0,40	0,74	70,99	—	5,65	3,16	2,65	13,17

TABLE F

ANALYSES OF THE ASHES OF THE LEAVES OF THE FOLLOWING TREES (IN 100 PARTS).

NAMES OF THE TREES	Silicic acid	Oxyd of iron,	Chlorine	Sulphuric acid	Phosphoric acid	Carbonic acid	Lime	Magnesia	Potash	Soda
	$Si\,0^2$	Fe^20^3	Cl	$S0^3$	Ph^20^5	$C0^2$	Ca 0	Mg0	K^20	Na^20
Red-Cebil.....	4,8	1,71	0,41	1,04	7,28	27,77	28,99	2,26	20,76	4,84
White „	16,11	1,57	0,93	0,36	4,24	31,91	35,38	1,26	6,60	6,14
„ *Quebracho* (Córdoba)...	3,73	0,92	1,35	1,04	4,07	35,18	31,40	6,87	10,63	4,81
„ „ (Salta).....	18,86	1,33	2,48	0,58	12,43	18,67	26,95	3,16	15,54	—
Flexible „ (Córdoba)....	9,87	0,76	1,24	0,39	7,60	30,77	29,21	10,16	9,97	0,03
Espinillo.....	8,66	2,00	0,74	1,33	5,00	31,34	39,11	1,22	9,95	0,65
Algarrobillo.....	3,94	0,94	0,47	2,10	4,59	33,74	40,09	1,94	11,79	0,40
Black-Algarrobo.....	4,53	0,82	0,82	0,71	4,53	34,32	28,87	6,22	15,28	3,90
White „	2,54	0,33	0,73	1,90	1,47	38,57	36,17	5,32	8,71	4,26
Wild Nogal—Ang. Walnut.....	5,76	1,01	1,23	0,71	4,06	32,24	31,98	1,61	20,32	1,08
Tipa.....	2,52	3,21	2,01	2,88	10,47	25,29	32,24	3,13	16,50	1,75
Lecheron.....	26,77	0,74	0,87	6,61	7,35	17,91	26,37	2,77	9,85	0,75
Lapacho.....	2,64	0,97	0,33	0,87	2,71	38,32	31,22	10,14	12,52	0,28
Tala.....	6,47	0,49	0,50	1,47	2,19	34,60	28,63	3,00	18,93	3,72
Chañar.....	3,61	0,56	1,74	1,80	5,27	31,88	29,56	4,12	17,30	4,16

TABLE G

Names of the trees	100 parts of leaves dried in the air contain.		Salts contained in 100 parts of the ashes of the following leaves.											
	Water	Ashes	Silicic acid	Oxyd of iron	Common-salt	Phosphate of lime	Carbonate of lime	Phosphate of lime	Carbonate of magnesia	Phosphate of potash	Phosphate of soda	Carbonate of potash	Carbonate of soda	Chlorate of potash
			$Si0^2$	Fe^20^3	Na^2 Cl^2	$Ca0.$ $S0^3$	$Ca0.$ $C0^2$	$Ca0^3$ $Ph^2\,0^5$	$Mg0.$ $C0^2$	K^20^3 Ph^20^5	$Na^2\,0^3$ $Ph^2\,0^5$	$K^20.$ $C0^2$	$Na^20.$ $C0^2$	KCl
Red-Cebil	9,10	4,57	4,80	1,71	0,69	1,78	47,38	—	4,74	21,77	—	9,24	7,89	—
White-Cebil	9,85	7,42	11,64	1,58	1,54	0,63	62,85	—	2,65	9,94	2,13	—	7,04	—
„ *Quebracho* (Córdoba)	12,00	6,91	3,72	0,90	2,22	1,78	54,90	—	14,46	4,38	6,20	11,44	—	—
„ „ (Salta)	8,70	4,92	18,90	1,34	—	0,99	34,55	13,27	6,66	19,07	—	—	—	5,22
Flexible „ (Córdoba)	10,50	8,12	9,87	0,76	0,05	0,66	44,69	7,43	21,38	12,61	—	—	—	2,55
Espinillo	8,45	6,60	8,66	2,00	1,24	2,28	68,25	—	2,57	15,00	—	—	—	—
Algarrobillo	8,59	6,58	3,93	0,94	0,76	3,57	69,06	—	4,09	13,72	—	3,93	—	—
Black-Algarrobo	10,50	6,43	4,53	0,81	1,29	1,24	50,83	—	13,09	13,54	—	9,24	5,43	—
White „	10,50	9,70	2,54	0,33	1,21	3,10	62,43	—	11,21	—	3,36	12,83	2,99	—
Wild Nogal, Ang. *Walnut*	12,50	7,33	5,76	1,02	2,05	1,21	56,39	—	3,39	12,17	—	18,01	—	—
Tipa	9,46	5,77	2,52	3,21	3,33	4,92	49,87	4,62	6,60	24,93	—	—	—	—
Lecheron	11,64	8,65	27,05	0,73	1,43	11,09	33,84	5,21	5,82	14,83	—	—	—	—
Lapacho	9,30	9,14	2,65	0,98	0,53	1,48	54,70	—	21,17	8,10	—	10,39	—	—
Tala	11,50	12,59	6,47	0,49	0,82	2,51	49,34	—	6,29	—	5,06	27,83	1,19	—
Chañar	12,00	11,66	3,62	0,52	2,87	3,05	50,80	—	8,69	9,54	4,75	16,11	—	—

By these analyses it is seen that the greater part of these woods contain a considerable amount of lime. Five species, however, are excepted; they are the *wild-Walnut*, the *Tipa*, the *Lecheron*, the *Lapacho* and the *Jume*. It is to be remarked that none of these trees are provided with thorns, whilst the others have them in great quantity. Of these five, three—the *Lapacho*, the *wild Walnut*, and the *Lecheron* possess the greatest portion of potash. It is also seen that the quantity of potash always much surpasses the quantity of soda, excepting only in the *Jume*, which holds three times more of the latter than of the former.

The ashes of the *Lapacho*, the *Lecheron* and the *Tipa* are otherwise remarkable for a relatively large amount of phosphoric acid.

The ashes of the *Lapacho* and the *Jume* are the most interesting, without any doubt, on account of their extraordinary composition.

The Lapacho.

This tree is the ornament of our Northern forests due to its abundant violet-colored flowers. Its hight is considerable, and its leaves so much resemble those of the Walnut, that they could easily be confounded. The bark contains a shot-coloured substance as yet not studied—a kind of *Aesculin*—whilst the wood is above all remarkable, for not leaving more than 1 % of ashes containing the smallest quantity of inorganic substances. These do not consist as ordinarily of carbonates, but of phosphates and common-salt.

Silicic acid.....	0,94 %
Oxide of iron.....	2,24 „
Chlorid of sodium.....	7,52 „
Sulphate of lime.....	4,69 „
Carbonate of lime.....	24,28 „
Phosphate of magnesia.....	17,74 „
„ „ *potash*.....	42,59 „
	100,00 p%

The Jume.

The *Jume* is a bush peculiar to the Argentine saline-heaths. The difficulty of separating the bark, the leaves and the wood, determined me to burn the plant entire for the purpose of studying its ashes, which—owing to their alkaline properties long since known in the country—have an industrial application. General opinion attributes these saponifying properties to the presence of a large amount of potash; but, inasmuch as the plant is only found in salt-lands, I thought that its ashes would contain principally the salts of soda.

In effect, the analysis has proved to me that the dominant salt is the carbonate of soda.

Oxide of iron.....	0,64 %
Common-salt.....	19,38 „
Sulphate of lime	9,50 „
Carbonate of magnesia	0,94 „
Phosphate of potash.....	12,15 „
Carbonate „ „	7,80 „
Silicate of soda.....	7,86 „
Carbonate of soda.....	41,73 „
	100,00 %

Of all known plants the *Jume* gives the greatest quantity of ashes, as the *Lapacho* gives the smallest. It burns with the greatest facility even when green, and gives an intense heat.

The ashes of the barks of these trees are generally the richest in lime, with the exception of the *Lecheron* which like the *Lapacho* is richer in potash. The bark of the *white Quebracho*, of Salta comes next. The exterior and hard-bark of the *white Cebil*, is distinguished by a relatively large quantity of phosphoric acid, whilst that of the *Lapacho* which is so rich in phosphoric acid, produces ashes composed of $\frac{3}{4}$ parts of carbonate of lime.

The two following tables present the chemical analysis of the ashes of the leaves.

The analysis of the ashes of the barks and woods gives uniform results. The composition of the ashes of the leaves on the contrary, presents great variations. It may be deduced from this peculiarity that these organs so essential to vegetation, have separate necessities and a special constitution, by virtue of which they absorb gases furnished by the atmosphere that contain the mineral substances which constitute for them a distinct subsistence from that of the tree.

In general the quantity of phosphoric-acid is greater in the ashes of the leaves, than in those of the woods and barks; the same may be said of the potash. We cite as an example the *red Cebil*, the *wild Walnut*, the *Tala*, and the *Chañar*.

It is not possible to determine the proportion between the amount of ashes given by the leaves and that furnished by the woods and the barks, because they vary at every trial, and could not be the basis of any rational conclusion.

CHAPTER XV.

TEXTORIAL INDUSTRY AND DYE-STUFFS.*

ALTHOUGH it is nearly four hundred years since this country has been in contact with the Old World, the native textine, and dyeing arts, are yet in an embrionic condition. Among the Indians all woven material up to the present, is made from the fibre of the Chaguar, and in the Provinces from the hair and wool of divers animals, with which are fabricated the *Ponchos*—cloaks—and *Chiripaes*—loin-wrappers—which constitute the indispensable clothing of the *Gaucho*—nomad cattle-driver—.

The *Poncho* and *Chiripá* are simple garments, adapted to the climate of the country and easily found throughout its vast extent. because they are indigenous productions, and do not—like the European dress—require a tailor to make them. The *Poncho* takes the place of the jacket, waistcoat and over-coat, whilst the *Chiripá* substitutes the drawers and pantaloons, and if in summer the *Gaucho* lays down to sleep in the open-air his dress takes the place of mattress, sheets and blankets; if moreover, he can provide himself with a pair of elegant boots with silver-spurs, he is in his holiday attire, and believes himself master of the world; especially when, mounted upon his best horse saddled anew, with silvered-reins and the *lazo* at his crupper, he gallops across the wide-spreading plain.

Formerly the Ponchos and chiripaes were made only in the country, but now they also come from abroad and are generally cheaper, although these imitations are of an inferior quality. The linen and cotton stuffs of the drawers are made here as well as imported, but the countrymen adorn them with a species of embroidery made with admirable skill. Their daughters use no other instru-

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* By Prof. Max Siewert, Sc. Dr.

ment to make all these embroideries, laces, meshes, etc., than a pin or a simple needle, therefore it is not surprising that much patience, ability and time, are required to finish them. In view of this fact they ought to cost much more than they do, yet on the other hand, it is evident that similar works by machinery, are much more uniform.

Although the cotton-plant is easily produced in the Northern Provinces and in the Gran-Chaco, thus promising in future a good return from the soil, it is not as yet much employed in native textile-industry, being only used by means of the spindle, to make wicks for tallow-candles. Flax is not cultivated either, although it grows very well. The Indians of the Gran-Chaco employ only the Chaguar—a plant of the *Bromeliaceæ*—which covers the ground there for about one hundred square-leagues, and of which they make the threads which not only serve to make their nets, but also the few cloths with which they cover their naked bodies. Sometimes they dye them of different colors.

Up to the present, it has not been possible to export the fiber of the Chaguar—or Caraguatá—, because the roads between the frontiers and the littoral are in such bad condition, the prices of transport are too high. However, when once the railways are terminated to the Northern frontiers, the fiber of the Chaguar will compete with the hemp of Manilla, which is less uniform and durable.

The wool of Sheep, Vicuñas, Guanacos, Alpacas, Llamas, etc., furnishes at present the principal material for the manufacture of thread and cloths. The natural color of vicuña wool—which formerly was the only material used to make ponchos—varies from white to a dark-brown. By separating the filaments of different tints and making threads of them with the spindle, they then weave the garment in a loom of most primitive and imperfect construction. The principal merit of the true ponchos thus made, consists in their impermeability to rain-water, whilst they are at the same time light and fine. The high-price which these ponchos bring at present, is justified for various reasons. On the one hand hunting the animals is somewhat difficult, and inasmuch as they do not produce many young, they will soon disappear, as the Chinchillas have already done. On the other only wealthy persons can purchase the finest of these legitimate ponchos, others must be content with European imitations, or with those which are made in the country-districts with the wool of Sheep, Alpacas or Llamas. The commonest wool in use is that of Sheep, and it is evident that it must be dyed so that the ponchos made with it should imitate the color of those made from the wool of Guanacos and Vicuñas; and, inasmuch as the countryman is fond of the greatest contrasts in colors, the wool is dyed of all imaginable and possible

colors. Although these tints are fixed, they nevertheless want brilliancy, and as the countrymen do not know how to well separate the greatest part of the different coloring-matters contained in the indigenous plants, they appear to be dirty and impure. The wool and silk—the cultivation of which was formerly much disseminated, but latterly much diminishes on many accounts, such as sickness of the worms, etc.—are generally dyed with fixed colors made from vegetable substances, for which reason many mordants are neither used nor known; nevertheless, some mineral mordants are applied to fix several of the most delicate tints.

Therefore we will treat separately about the mineral, animal, and vegetable dye-stuffs.

I. **Inorganic substances.**

It is not known as yet, how to prepare the red-lacs; viz., the combinations between the true animal and vegetable coloring-matter, and between the acids and mineral bases, but they are content with the simple impregnation of the cloths by the different salts, so as the better to fix the coloring matter in the threads. The mordants in use are:—

1. *Alum and sulphate of alumina.*—Both these salts are found in a natural state in the Provinces of Jujuí, Salta, Rioja, Catamarca and Córdoba.

2. *The salts of lead*, have not as yet been much applied. The country-folks prepare the acetate of lead by dissolving the oxide of this metal in vinegar; a *litharge* results from separating the silver from the argentiferous lead.

3. *The sulphate of copper.*—This salt is generally found somewhat mixed with green-vitriol, in the districts of the copper-mines of the Provinces of Catamarca, Rioja, San Juan, Salta, Jujuí and Córdoba.

4. *The sulphate of iron*—green-vitriol or copperas.— Copperas has more frequent application than the sulphate of copper, because it is more frequently found, and it is used in the founderies to facilitate the fusion of the argentiferous lead-ores, and for the making of ink.

5. *The combinations of potash.*— In almost all the Provinces the vine is cultivated, but as yet it is known only in a few places how to prepare the cream of Tartar—bitartrate of potash—which is made by the fermentation of the must; with the development of viniculture in the country, and the exportation of this cream, and of tartaric-acid which is extracted from it, a new source of abundant wealth will be created.

6. *The carbonate of soda.*—This salt is extracted from the ashes of the saline-plant called Jume—see the article upon materials

for tanning—. It is generally supposed that these ashes contain the carbonate of potash, but it is a great mistake. Enormous quantities of carbonate of soda are consumed for different purposes.

II. **Animal substances.**

The Cochineal.—This insect—*Coccus cacti*—grows in abundance upon the greatest part of the *Opuntia* of this country, more particularly in the Provinces of Córdoba, Mendoza, Santiago del Estero and Rioja. If the people possessed more activity and spirit of self-interest, the preparation of Cochineal would produce a splendid return. In all parts of the country the *Tunas*—or prickly-pears—are used for hedges, or to protect vegetable gardens, but less in view of the production of Cochineal, than to harvest the fruit which is eaten fresh, or under the form of a thick-syrup, made by cooking it in copper-vessels. In those parts where the Cochineal is gathered, it is crushed in wooden mortars, and afterwards the paste is formed into little-cakes which are sold when dry, under the name of *grana—Angl.* scarlet.

III. **Vegetable substances.**

It is very difficult to write a clear explanation about the vegetable dye-stuffs which are in use in the different Provinces, because, the natives call the same plants or trees, by different names, or because, they use the same name to designate very different plants.

Inasmuch as a considerable portion of those trees or plants are not as yet scientifically determined, we are compelled to use the common names, adding thereto the botanical designations only when they are well known.

For the purpose of facilitating the study of the vegetable coloring substances, we will now treat them in their order, according as either entire plants, or only their flowers, leaves, fruit, roots, or wood, barks be used.

a. Entire-plants.

1. Indigo—*Indigo añilifera* a papilionaceous plant—. There are two species of indigo, the one cultivated, which being treated in the same manner at the Chinese plant, produces an identical coloring matter that makes a blue-deposit by the action of concentrated sulphuric-acid; the other which is wild, is called *Añilcillo* or *Añilillo*, from which a blue-matter is also prepared, but somewhat distinct from the first, because it only forms with concentrated sulphuric acid, a white insoluble paste. This white-mass

in water, again gives a blue-dye without being decomposed. For the purpose of using it as a dye, it is necessary to ferment it in an alkaline liquid.

The *añil* is employed to dye both blue and green. Inasmuch as the first application is well known, it is not necessary to explain it. In respect to the second, we will say a few words. The threads of wool are first stained yellow with the juice of the *Valda*, of the *Chilca-dulce*, of Saffron, etc.—see further on—and then they are dipped two or three times into a solution of *añil*. If the tint is then of too-deep a blue, they are again dipped into the yellow-liquid.

2. The saffron—*Chuquiraya chrysantha*, Gries.— The first watery decoction contains a yellow-color, the second a red-one; but it is evident that the separation of the two coloring-substances by this method, is very imperfect.

3. The wild Chamomile—Sp. *Manzanilla silvestre*—. A number of very different plants are comprehended under this name. None of them have, however, any similarity to the *Camomilla*; *i.e.* to that medicinal plant which is called *Manzanilla* in this country. One of the vegetables which erroneously bear this name is a *Ranunculaceæ*, another a *Solaneæ*. Both produce in the Spring—October—a yellow-floweret. The dry-plant is cooked in water charged with alum; by dipping the wool into this boiling-liquid it is dyed a clear-yellow.

4. *The sweet-Chilca.*— This plant which is found on the shores of the rivers in almost all the Provinces is a resinous and very aromatic little-bush belonging to the family of the *Compositæ;* it produces a fragrant and at the same time somewhat sweet-fruit, thence its name of Chilca-*dulce*. The juice extracted from the green-plant, produces the same color, but inasmuch as this tint is not of long duration, the dry-bush together with its fruit, is generally used to dye yellow. For the first, the wool and silk are previously impregnated with alum and then dipped into the boiling watery-solution of the coloring matter; for the second, a coloring-bath of the plant is first prepared, by boiling the dry-bush for a long time in water charged with alum. The boiling-liquid is then strained and returned to the vessel which has been cleaned: the threads are then boiled in this bath until the tint is satisfactory to the dyer. Then, the wool or silk already dyed, are dipped into a solution of the bicarbonate of ammonia.

5. The *Palala* is a plant, very little known, which produces a fiery-orange color.

6. The *Valda* or *Balda*, is a vegetable which not only has many uses, but also many names. In the Quichua language it is called *Kejatulpuno*, and in the Northern Argentine Provinces, *Queltotarpo*. Wool is dyed a very firm-yellow in the extract of

Balda, without having been previously impregnated by any mordant. As before said, the wool dyed yellow by the *Balda*, is tanned to green when passed through a solution of *añil*. On the other hand should these yellow-threads be dipped into a hot-bath of carbonate of soda—or lye from the *Jume*—the yellow tint becomes orange.

7. The *Tojo* or *Santa-Maria*, is a bush probably identical to the *Tecoma stans*, Juss., some five meters high; it produces in the Spring a very delicate yellow-flower, the extract of which of the same color, is inalterable by alkalies.

8. The *Tola* is an arboret which chiefly grows in Puna—Province of Salta—and is used for dyeing yellow. For this purpose the threads of wool are dipped into an aqueous extract which has been prepared by boiling with alum. To fix the color, the dyed threads are then boiled in a bath of urine or carbonate of ammonia.

9. The *Figue* or *Fije*, is a plant which belongs to the family of the *Cinchonaceæ*. It is said to contain a yellow-tint, but its application and composition are alike unknown.

b. Flowers.

1. The *Clavelina—Zinnia*,—is principally used to produce a scarlet color.

2. The *Malva*—mallows—. The dark-violet flower of the *Althæa rosea*, serves as in Europe, to produce with alum tints from grey to violet-blue, and dark-violet with the salts of tin.

c. Leaves and fruits.

1. The *Molle á teñir—Duvana fasciculala*, *D. præcox* and *D. dependens*—. The youug branches with their leaves and fruit are specially used to tan hides, because they contain 19.2 % of tannin, but they also produce with the use of copperas, a grey-tint in wool.

2. The *Espinillo bravo*, the *Tusca aromatica* and the *Charquí*. In almost all the Provinces the names of these three different trees are confounded; the first is botanically called *Acacia cavenia*, the second *Acacia aroma*, Gill., and the last *Prosopis adstruigens*, Gries. Their fruits are rich in tannin, therefore they can be used with copperas, to dye from grey to black.

3. The *Guayacán—Cæsalpina melanocarpa*, Gries.— The fruit of this tree is called *Algarrobillo de Guayacán*. The natives call all fruits similar to bean or pea-pods, by the name of *Algarrobilla*, a signification not only applied to the fruits of the different trees, but also to the trees themselves, which causes much confusion. The fruit of the *Guayacán* is short and thick, and con-

tains some five seeds. Whilst these are wanting in tannin, the pods contain almost 23 % of this material in a very pure state. Inasmuch as the *Gaayacán* is a very abundant tree in the Northern Provinces, and produces a great quantity of fruit, it offers a material which in future will call the attention of the country-folks, as an important object of exportation.

d. Roots.

1. *Alvarillo, Albaricoque, Albaricoquillo, Damasco.*— Although these fruit-trees are not completely identical, and according to their state of cultivation produce more or less diverse fruits, they all belong to the genus *Prunus.* The coloring-matter which the bark of their roots and a part even of their trunks contain, produces a yellow-tint with alum, which by the use of carbonate of soda—lye of the *Jume*—is transformed to dirty-crimson.

2. *Raiz-punzó—Ang.* red-root—. As yet it has not been possible to ascertain the origin of this root. With alum, the watery extract produces the same color as the roots just mentioned, whilst if the threads are afterwards treated with carbonate of soda or of ammonia, the tint is transformed into a deep-scarlet-red.

3. *Raiz del Cerro* or *Soconto.*— This root contains a highly-esteemed color, probably the *Alizavnia* which has not been heretofore found except in the *Rubia tinctorium.* The plant called *Soconto* belongs to the genus *Galium,* and is probably the *G. hirsutum* or *Richardiarnum,* Endl. The roots of the plants which grow upon the upper parts of the high-lands, are the most esteemed. The wool is dyed without any mordant from crimson to dark-wine color; the tints are firm and resist the action of both soap and the rays of the sun.

4. *Raiz de Pata.*— The Pata is a low-tree: in the bark of the roots, in that of the trunk, and even it appears in the wood itself, a coloring-matter exists which has not yet been studied, but which with alum produces a tint called "Coffee-color."

5. *Sacha-uva—Berberis—.* Like the European species of *Berberis,* the roots of this plant contain a yellow-matter—the *berberina*—which without mordants, dyes wool a very-fine yellow.

e. Barks.

1. The *Cebil—Acacia-cebil,* Gries.— The bark of this tree which grows in the Northern Provinces of Tucumán, Salta, Jujuí and Gran-Chaco in great abundance, is principally employed in the tanneries, because it contains some 15. 5 % of tannin. In combination with copperas, it can also be used in dyeing to produce tints from grey to black, as is now done in the cloth and dyeing establishment of Sr. Don Prudencio Palacios, situated on the bank

of the River Piedras in the Province of Salta. This factory is the only one of the kind in the Northern Provinces; it works on the wholesale principle, but only makes ponchos and blankets.

2. The *Sauce—Ang.* Willow—*Salix Humboldtiana*, Willd. The extract of *Sauce*-bark, as also that of the *Algarrobo blanco*, produce the tints most esteemed by the country-people. It is said that long ago the natives endeavored to imitate artificially the natural tint of the Vicuña-wool, because the ponchos woven with this wool have the highest price, and the best quality. As it is extremely difficult to separate the fibers of the Vicuña-wool in such wise, that the different tints may be woven exactly equal, a substance which will dye any other white-hair or wool, the color of that of the Vicuña—coffee-color—in its shades, and be at the same time firm and lustrous, must be of great value.

Only the extracts of the barks of the *Sauce* and the *Algarrobo* (see *apud.*) serve efficaciously to this end. To produce the deepest tints of the brown-color, the cuticle of the willow-bark is employed, but the derma is preferred for the lightest tints. It is necessary however, to saturate the threads with alum as a mordant, before attempting to dye with the *Sauce*.

3. The *Nogal-silvestre*—or wild-Walnut—*Juglans nigra*, var. *Boliviana*, answers the same purpose as the *Sauce*, but its colors are less firm and brilliant.

4. The *Coronillo.*—Vide *apud.*

f. Woods.

1. *Quebracho colorado—Loxopterigium Lorentzii,* Greis.— By boiling the saw-dust or shavings of this wood in water, a dark-brown liquid is procured, which being evaporated to dryness and then cooled, produces an almost-black resinous residuum, which is brittle and of a certain lustre, but of which as yet no scientific experiments have been made. Therefore, neither its chemical composition nor its physical properties are well-known, but from its appearance it is very similar to the matter which long since has been known in commerce, by the name of *dragons-blood.* The extract of *Quebracho* is used alone, to dye wool, or else with mordants such as alum, copperas, or sulphate of copper. In the first case, the wool is dyed from bright, to dark-brown; in the second, from grey to black; and in the third, a violet-red.

2. The *Algarrobo blanco—Prosopis algarrobo*, spec. Gries.— A brownish-black sap sometimes runs down in the bark of the very-old trees which impregnates it with a resinous and gummy substance that completely disolves in hot-water, thus forming a dark-brown tint very similar to the extract of *Quebracho colorado.* By detruncating the trees some centuries old, a black and extremely-

bitter sap exudes from the wounds, which little by little solidifies in the air. This has not been as yet, scientifically analysed. The aqueous extracts of the wood evaporated to dryness, do not solidify in the cold as much as those of the *Quebracho colorado*, but only form delicate, viscous, and somewhat tough, superficial laminæ. The solution of the coloring-matter of the *Algarrobo*, without recourse to any mordant, produces very-firm colors not only in wool and silk, but also in cotton-wool and the fiber of flax of the *Chaguar* or *Caraguatá*. The color varies from the clearest to the blackest-brown, according to the manipulation.

3. The *Coronillo*.—Its appears that both the bark and the wood of this plant contain the same coloring-material, which the natives call *tinta-punzó*—deep scarlet-red. As some families pretend that the preparation and the application of this coloring-matter is a private secret of their one, it has not been possible to procure any reliable explanations about it.

4. The *Lapacho—Tecoma asper*, Gries.— This tree belongs to the family of the *Bigñonaceæ*, and is one of the most elegant representatives of the sub-tropical vegetation in the Northern Argentine Provinces; nevertheless, the botanical studies made upon it are not as yet quite exact. Probably several species of *Lapacho* exist, one of them before the new leaves sprout in Spring, is so thickly covered with the most delicate-flowers, that no ray of the sun can pass them. But this tree is not only interesting on account of its flowers. The wood of its trunk is one of the strongest, and therefore it is in most extensive use. The axles of carts, as also entire wheels, ox-yokes – the teeth of cog-wheels, and carpenter tools, etc. etc., are made of it. In a chemical point of view the wood of the *Lapacho* has also very notable qualities. Firstly, of all the Argentine plants and woods, it produces the least amount of ashes, which are composed of salts of phosphoric acid. Secondly; the chemical composition of its organic material is very complicated. Up to the present, about 7 % of tannin has been determined in its bark, as also in the wood; and 7. 5 % of a yellow coloring-matter which crystallizes well, and about 12. 5 % of another coloring-matter of less value, which is not crystallizable; also, about 5 % of a substance similar to caoutchouc. As the latter, as well as the coloring-substances, are insoluble in water because they are resinous, it is not strange that the wood long resists putrefaction: yet more; it is asserted that when this wood has remained some time in the water, it becomes indurated to such a degree, that it is not possible to cut it with steel-axes.

As yet, only the yellow coloring-substance which exists already crystallized in the wood, has been scientifically studied. To prepare this very important dye-stuff, and to separate it from the others, a quantity of the dust or shavings is boiled in iron-vessels,

to which is added 10 grams of the crystallized carbonate of soda for each kilogram of the wood. After boiling for an hour it is heated two or three times anew, with fresh quantities of water in other vessels. To the liquid extract which results from the first portion of the wood already treated, the same quantity of wood and a proportionate quantity of carbonate of soda are, added, without interrupting the ebullition of the liquid. The first portion of wood already treated is then thrown into the second vessel which contains the same quantity of water, and to which for each kilogram of wood, 5 grams of carbonate of soda have been added. It is proper that the second extract should also be made by heat. After an hour be passed, the wood of the second vessel should be passed to the third vessel, which only should contain pure and cold water, and that of the first to the second, and so on. If in the first vessel, five kilograms of wood to ten liters of water have been treated, the concentrated extract is thrown into another vessel to cool and deposit its impurities, then the liquid of the second vessel is passed to the first one—where it serves to treat fresh portions of the wood—, that of the third to the second, and that of the fourth to the third. The wood which was in the fourth vessel is now found to be completely deprived of its coloring matter. Finally, the water which served to boil the shavings in the two first vessels is added to the cold-extract, which is precipitated by crude hydrochloric-acid, until the liquid colors litmus-paper red. The yellowish-green substance is precipitated in the crude coloring-matter. After filtering and washing it in rain-water, it ought to be purified according to the following method. It is dissolved with an equal weight of crystallized carbonate of soda in ten parts of boiling-water. The filtered-liquid is again precipitated when cold, by hydrochloric-acid, and the precipitate is washed until the water in which it is so treated, does not present any acid reaction. Finally, the dried mass is dissolved in boiling-alcohol, and after filtering the alcoholic liquid to separate the last impurities, it is crystallized. By following this method, 10 kilograms of raw-material, and 7. 5 kilograms of pure crystallized-matter will be obtained from 100 kilograms of wood, which is soluble in 7. 75 parts of boiling-alcohol of 85 %, or in 94. 5 parts of cold-alcohol. Inasmuch as this coloring-material, hitherto unknown, easily eliminates the carbonic-acid of the carbonate of soda, and dissolves into a liquid the color of blood, it is sure that it represents an organic-acid; therefore, according to its origin, it has been named *Lapachic-acid.*

This acid, when crystallized by ether, forms very delicate little leaves of a somewhat greenish-yellow color; crystallized by alcohol, the leaves and prismatic crystals are very small; and crystallized by sublimation, they form the finest needles. As yet, it

has not been possible to determine with certainty, its crystalline form, but it appears to belong to the quadratic system. Like the acid, all the salts of this wood which have been prepared up to the present, dissolve in boiling-alcohol.

The *Lapachic-acid* is extremely sensitive to any trace of free basic-materials, and to the carbonates dissolved in water. For this reason it appears, that it would be well to prepare reactive papers; and in effect, filtering-paper impregnated by the lapachate of soda—a violet-red paper—is stained yellow by the liquid-acids, and the yellow-paper becomes obscured by the basic-liquids.

The lapachates of lead and barytes, when crystallized in alcohol, do not contain any water; but the lapachate of soda crystallized in water, retains a considerable quantity of it; thus it happens that with the simple heat of the bath-of-Maria, it melts in its own water, but crystallizes again when cold, and afterwards appears on the surface like velvet of a dark-violet color.

When treated by hot-concentrated nitric-acid, the lapachic-acid is partially dissolved and gives off brilliant vapors, but in somewhat diluted acid it is completely dissolved. A carmin-red matter —nitro-lapachic-acid—crystallizes from this solution, which as yet is incompletely studied.

The *Lapachic-acid* when treated by hot sulphuric-acid is completely dissolved, without giving off any gas, but it forms a blood-red liquid. On throwing this liquid into water an orange-colored matter is precipited, the which when washed in water and afterwards dissolved in boiling-alcohol, crystallizes in fine, brillant needlles, of a greyish-color. Whatever remains dissolved in the aqueous liquid—such as the glucose—reduces the cupreous-alkaline solution of Fehling. The crystalline product which results from the action of the concentrated sulphuric-acid, was previously called *Lapachonic-acid.* The same reaction is effectuated by boiling the *Lapachic-acid* for a long time with diluted sulphuric, or hydrochloric-acids.

The analyses which have recently been made, seem to indicate that the composition of the two acids gives the following formula:—

$C^{36} H^{40} O^{6}$ = Lapachic-acid.
$C^{20} H^{20} O^{4}$ = Lapachonic-acid.

LAPACHIC-ACID.		LAPACHONIC-ACID.	
Determined.	Calculated.	Determined.	Calculated.
C = 76,15 %	— 76,06 %	C = 74,00 %	— 74,07 %
H = 7,06 „	— 7,04 „	H = 6,18 „	— 6,17 „
O = 16,79 „	— 16.90 „	O = 19,82 „	— 19,76 „
100,00	100,00	100,00	100,00

The matter formed by reducing the neutral solution of the lapachate of ammonium by means of gaseous sulphuric-acid, has not yet been well studied.

The *Lapachic-acid*, its salts, and the products of its decomposition, merit much attention from dyers, because, according to the mordants and the degree of concentration of the flux—the neutral solution of the lapachate of soda, and the manipulation of the operative, they produce very diverse colors in wool and silk; that is to say, whether the goods impregnated by the mordants be soon passed through the flux of the coloring-matter, or the contrary; or whether they are dyed in cold or heat.

The following colors are produced:

1. *Rose crimson.*— Chlorid of tin, alum or acetate of lead, are used for mordants; then dye in a flux of the lapachate of soda, and purify by soap.

2. *Yellow.*— Saturate the cloth with the bichlorid of tin, then pass it through the hot-flux of lapachate of soda; dry it, and purify in a hot bath of lapachonic-acid.

5. *Clear-brown*—coffee-color—. According to the strength of the mordant—of sulphate, or better, of acetate of copper—and of the flux of lapachate of soda, each one of the tints of brown will be produced, operating in heat. The goods are afterwards cleansed by soap.

6. *Dark-brown.*— The goods impregnated with chlorid of iron are dyed in heat in the flux of lapachate of soda, and afterwards cleansed by soap.

Appendix.

The soot, or black of the chimneys and kitchens, is also dissolved and used in water to produce various tints of orange in woollen-goods.

During the past centuries the use of soap was unknown in the country; and even to-day, this article is not very abundant in the hands of the Argentine country-folk. But, inasmuch as it had been observed that the wool of the sheep could not be well dyed without having its greasiness first destroyed, they hunted for other natural materials which could effect this object.

Where the *Pacará—Enterolabium timboica,* Mart.—grows in the Provinces of Tucumán, Salta, Jujuí, and the Chaco, the fruit of this tree, which contains about 15 % of saponin, is used; this is substituted in the central Provinces, by the liquid which is prepared by boiling in water the bark of the *Mistol—Zysiphus mistol,* Gries.—or the *Quillay*, an herbaceous plant of the *Papilionaceæ* family, or the *Cachichugo* a *Quenopodiacea* called *Airiplex pampanum;* or finally, by the lye of the *Jume,*—*Spirotachys patagonica* and *S. vaginata,*—saline-plants which are found in almost all parts of the country, whose ashes are principally composed of carbonate of soda. (See Chap. on tanning-materials).

CHAPTER XVI.

AGRICULTURE.

THE natural condition of agriculture in the Argentine Republic is anything but satisfactory, because old habits of routine govern it, and progress is as yet but slow. Nevertheless, all the primary conditions for its successful prosecution—hardly to be surpassed anywhere—are found here. The fertility of the soil is astonishing, and the climate is in the highest degree favorable both to the cultivation of the soil and the breeding of cattle; and finally, the transit routes are partly established by nature in our rivers—as yet so little used—and in part are easily made at small cost.

It was necessary, therefore, to struggle at first against routine, and a positive step has been taken towards this result by the creation of an Agricultural Department, which commenced operations on the 1st January 1872, under the direction of Mr. Ernest Oldendorff, who both by theory and practice is versed in this branch of science, having graduated in the best schools of Germany. The salutary influence of this agricultural administration still so recent, is already felt in almost all parts of the country, and latterly the Department has created Inspectors in the Provinces, who belong to its jurisdiction. This is a step in the right direction.

But few years have passed since the plow commenced its civilizing work in the Argentine Republic. The breeding of cattle was too lucrative and too easy, therefore the Argentine without an impulse from abroad, could not determine to change it for another occupation which exacts more assiduity and patience, and whose results were unknown to him, especially, inasmuch as the former is in accordance with his natural inclinations. The success of the immigrant farmers although as first but feeble, was required to teach

him the importance of agriculture. We see therefore, by its results, the value of this solid agricultural immigration.

As it might be believed from the preceding remarks that agriculture was completely abandoned or unknown here, we ought to say such was not the fact, although it is true that it was neglected to the greatest degree when the Republic was a Spanish colony, even in those districts where it was the principal occupation of the inhabitants. On the one hand, the population was then too sparse to produce a considerable consumption; whilst on the other, the exportation of agricultural produce was prohibited. If to these difficulties which then hindered the increase of agriculture be added the want of hands, an inevitable consequence of the above-mentioned conditions,—for the planters would not introduce slaves for work which was not productive—it may be well-conceived, that agriculture on a large scale was unknown some time ago, and that the cultivation of the cereals was limited to the scant supply of the planters themselves. Moreover, the consumption of grain only took place in those parts of the country where the raising of cattle had not become of such great importance as in the Provinces of the littoral, in which no nourishment but meat was known. The cultivation of the fields in those Provinces was therefore, so limited, that it may be reasonably said, that the plow is a conquest of our own days.

Per contra, other reasons existed in the Interior. The *Conquistadores* found there an indigenous population more numerous than themselves, which, if indeed it was not as advanced as the ancient inhabitants of Perú, had adopted many of their usages, and was experienced in the cultivation of the soil. The Spaniards had to accommodate themselves to the habits and customs they found there, and therefore they partially undertook agriculture which, to say the truth, was never rigorously exploited, but which nevertheless became of a certain importance, so that when the towns increased and consequently a greater consumption was established, they were provided with cereals from the Provinces of the Interior. For example, the distant Province of San Juan as late as the year 1860, still sent flour to the coast, which, notwithstanding the high cost of transport by land could compete with that of North America, and even surpass it in quality, although a better and in some cases a more artificial manufacture, gave to the foreign article a more favorable appearance.

But as we have said, agriculture has never been undertaken on a great scale in the Rio de la Plata up to the present time. With the arable instruments which are employed it could not be otherwise. Plows of wood, similar to those which are yet preserved in some of the museums of Europe as curiosities of primitive times, were exclusively employed, and are so yet in many

parts. The soil could only be superficially cultivated with them; any better result being entirely impossible. Yet the richest harvests were annually obtained without ever having recourse to manure; even two crops were often made without any necessity of working the fields more than once; because the reaping of the ripe-wheat was made, it may be said, in a still more primitive manner than the working of the fields, so that the shedding of the over-ripe ears returned to the earth a new-seed which quickly increasing in abundance saved the farmer the trouble of a second sowing. If the productions of the soil finally diminished somewhat, a new piece of land was taken. In a word, the system of cultivation in vogue was truly superficial, and that it has not produced injurious consequences is due on the one side, to the fact that the fertility of the earth is inexhaustible, and on the other that it was only the surface which was worn-out.

Perhaps it is owing to this detestable routine that the introduction of irrigation is due. Inasmuch as only the surface of the field was worked, the roots of the cereals could not penetrate sufficiently deep; they were thus so much exposed to the rays of the sun, that the smallest drought put the whole crop in danger. It was therefore necessary to prevent this danger by irrigation. Unfortunately in some parts of the country sufficient attention has not been paid to the improvement of the system of irrigation, and it may even be affirmed that in view of its condition under the Spanish dominion, it has even retrograded.

As we have already said the harvest was made with negligence, and consequently a great part of it was lost. The wheat, for example, was gathered when too ripe, and was often cut with a large-knife instead of with the scythe or sickle. When cut, it was dragged on a hide to an open-airy inclosure in the field which had been cleared of herbs, and there spread one foot thick; thereafter, a drove of wild-mares was introduced and driven in a cercle, to thresh it. Thus many grains remained in the straw owing to the defective threshing; and moreover, granaries being unknown, even the grain procured was left exposed to the weather, so that a strong tempest—such are not rare here during harvest time—could destroy the whole harvest.

It is not less true that agriculture has latterly undergone ameliorating changes. North America, Belgium and Germany, send us plows of iron of their latest and most approved invention; we also have machines to reap and thresh wheat, and before long the steam-plow will furrow our fields which are so level and free from stones and roots, that they seem to have been created for it. The Department of Agriculture procures the best seeds for the farmer, and is indefatigable in giving its advice and influence of all kinds; but the cultivation of the fields leaves much, very much, yet to

be desired, and it is worthy of mention that those parts of the country which formerly alone were cultivated, *i.e.*, the Interior Provinces, have improved less than the littoral Provinces, especially Buenos-Aires and Santa-Fé. Here, a constant progress is felt, which is a proof of the beneficial influence of European immigration, that as yet has established itself in preference in these two Provinces. This same factor will also soon essentially contribute to the amelioration of agriculture in the Interior of our so widely-extended country.

The yet unsatisfactory situation of our agriculture is due to these reasons that we have only indicated, as well as—we have already said—to the scarcity and dearness of hands which it is necessary to import. Nevertheless, the supposition which Dr. Burmeister defends is completely erroneous; he pretends that the pampa, consequently a considerable part of the Argentine Republic, is not fit for agriculture. Thus this *savant* says in the first volume lately published of his *Description physique de la Republique Argentine*—p. 190—that "the principal occupation of the country * is the breeding of cattle, and that it will ever be so in view of the disposition of the soil, although perhaps small portions may be changed into cultivated fields, and in others abundant orchards may be created:" and in an explanatory note, p. 394, he continues; "It is an old axiom based upon experience, that to undertake agriculture upon a new soil is not advantageous, except where a naturally-existing vegetation can be cut down to put another in its place: this last is always the inferior, in the point of view of the organization of vegetables, and that which has disappeared is the superior. It is thus that coffee is cultivated in Brazil, by destroying the magnificent virgin-forest and substituting it by the feeble boskets of the coffee-plant. But the pampa even in its fertile parts only produces a miserable herbaceous-vegetation, worth less than the spears of wheat with which it is desired to replace it. That will not do, moreover, it will never do: the pampa ought to remain the land of pasturage; it admits of formal working in certain favorable places, but it will never form in general, a cultivable soil; only that which the earth contains, or something similar to it which it has artificially appropriated, can be withdrawn from it, but you cannot give it that which it cannot produce; this is a certain result, as Liebig for the rest, has demonstrated in his work *Chemistry applied to Agriculture.*

Although it is not the design of this book to undertake any polemic such an opinion cannot be passed in silence, above all

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* If Mr. Burmeister persists in his error that the pampa is not fit for agriculture, he should at least not forget, that the country is not exclusively composed of pampa.

when it comes from a naturalist of the reputation of Dr. Burmeister.

We cannot here examine whether the controverted theory of Darwin upon vegetable regions has a scientific basis; nor can we deny the existence of the opinion, that, "where there are no thick-forests, the soil is bad;" or in other terms, "where the forest is feeble, so also is the soil," although the species of tree should also be considered: because it is a fact generally known, that a vigorous forest of Pines, and even a thick-forest of Palm-trees, will grow upon soil worth nothing as to fertility. From the supposition above-mentioned the conclusion ought to be taken, that, where there is no forest, the soil is too feeble for general cultivation. An opinion to which Dr. Burmeister renders homage not only in his last work already cited, but also in his *Voyage à travers les Etats du Rio de la Plata.*

In reference to our pampas it must not be forgotten that the absence of forests does not only arise from the quality of the soil, but rather from a great number of divers causes; for example, heavy and frequent winds are one of the principal obstacles. Are not the sterile-hills of Central Germany adorned with magnificent forests, whilst the plains of Northern Germany, celebrated for their fertility from the commencement, produce but few? Nor is it only in Germany that we find sterile mountains to be well-wooded, but almost over the whole earth their hights are ornamented with beautiful-forests, yet very rarely can plantations be made to succeed there, even when climatic conditions are favorable. The soil is worth nothing for that purpose, it is sterile notwithstanding its magnificent forest-vegetation. And, although the plain of Northern Germany, which is the granary of part of Europe, also holds forests in some small districts, they are exactly those which are distinguished for their sterility. On the contrary, the plains of Southern Russia are reckoned among the poorest regions of the earth in forests, for which reason they are placed in the same rank as the Argentine pampas; but instead of being unfitted for agriculture, they annually export millions of quintals of excellent wheat to the other countries of Europe. When the Memnonites settled there, who are recognized as among the best of agriculturists, they found themselves compelled to emigrate, because the Russian Government ordered them to perform military service contrary to their religious belief, and their delegates were charged to look for plains destitute of trees for their new abode; this is a proof that these men of the handicraft, judge very differently to theorists who have no practical experience.

The examples which we have cited are not the only ones where practice demonstrates the instability of certain theorotical conclusions, arising moreover from a false principle. Do we not see

that the Western part of North America stripped of forests, and the naked plains of Australia—where, moreover, the temperature is more elevated whilst the atmospheric precipitations are rarer than in our pampas—are the places the most sought for by the European agriculturist immigrant? Again, it must not be forgotten that wheat is not a tree but an herb, and that consequently, if we start from the principle that "nothing can be withdrawn from the soil save what it already possesses," treating here only of herbage, the true solution ought to be that the pampa is above all, fit for the cereals. Does not wild-wheat grow in the steppes of Tartary where it originated, that is to say on plains without trees analogous to our pampas, as also the maize on the savannahs which are the pampas of Louisiana, the country of its origin? Behold facts which certainly do not authorize the conclusion that grass being the vegetation of the pampa, it is unfit for the cultivation of wheat, pasturage, leguminous aud tuberous plants of all kinds.

We have already mentioned the success which a sensible agriculture derives from the prairies of North-America, and when an authority such as Prof. Grisebach the celebrated phytogeographer, says * that our pampas correspond to the prairies of Missouri, just as our *Monte* districts correspond to the *Chaparales* or to the *Buissons-Mesquitos* of Texas and New Mexico; when he proves, moreover, that our climate is not hostile, nor the composition of the soil at all unfavorable to the life of trees, on the contrary, rather partaking of the opinion of Darwin that the continual strong-winds are the cause why trees are wanting in the Pampa; it is easy to assert that they offer at least as favorable a field to agriculture, as the "Far-West" of the United States of North America. Mr. Grisebach says farther on, that the soil of the pampa is "excessively fertile," and if he proposes to dedicate our vast plains principally to the breeding of cattle, he is far from supposing that our country is not fit for agriculture; he thus speaks far more in the sense of a general interest, and all in all, he considers it to be more for the advantage of mankind to preserve a territory so appropriate for pastoral productions upon a large scale. It is certainly proper to approve of this supposition in principle, but the immense extent of our privileged country ought not to be forgotten either, as we have already said in our Introduction; the Argentine Republic contains more than space sufficient to undertake agriculture, and at the same time the breeding of cattle, upon the greatest scale. Within our boundaries the best pasturage is found over an extent of several thousands of square leagues, which will be occupied by the plow in proportion as the grazier is obliged to cede the lands he now occupies; moreover,

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* *Die Vegetations Verhältnisse der Erde*, vol. II, p. 449, *et seq.*

in the prosecution of a rational rural-economy, the raising of cattle ought to proceed *pari passu* with husbandry.

Finally, the Argentine Republic is not obliged to prove the fitness of its soil for agriculture, by comparison with countries of an analogous character; it furnishes itself the most conclusive evidence in its favor. The farming centers in Santa-Fé, Entre-Rios and Buenos-Aires, are flourishing under every aspect: the laborers from the large cities of Europe which settled in them without having had any previous knowledge of their present calling, have attained easy positions and even wealth in a short time. And still, we can assert that the cultivation of the soil annually increases in the country districts of the Province of Buenos-Aires, which is properly speaking entirely composed of the pampa.

Farther on in this book, we will make a more extended notice of these agricultural establishments, that is to say, of those which are inhabited by foreign immigrants; we will only mention here that the amounts exported from the country-districts of Buenos-Aires, according to official statistics based upon the crops of 1873, —none having been published since then—were, 30,000 quintals of maize, 25 quintals of barley, and 310,000 quints. of wheat, of which 13,000 were produced by the district of Chivilcoy, and 43,000 of Patagonia. Naturally, the home consumption is not comprised in these figures, which although not high, compel us to remark that the producers as yet only number some hundreds of persons; and, excepting in the district of Chivilcoy, agriculture is considered as a secondary object to which but little care is given.

Finally, we refer to Chap. IX of this work, where a *savant* in chemistry gives information about the chemical and physical constitution of the soil of the pampa, and declares that the ensemble presents the greatest analogy with that of the delta of the Nile and the valley of the Rhine.

Thus there can no longer be a question about sterility or the unfitness of agricultural enterprises on the soil of the pampas, and this is a fact of the highest importance for the Argentines, because it can no longer be doubted that this Republic will owe its future imposing grandeur to the development above all, of its agricultural and rural industry in all its branches.

Yet we would not assert that all our vast Argentine territory offers an equally rich field to the diligent and experienced cultivator. As every where else, there are places which are less—or not at all—appropriate for agriculture, but they are rare indeed in comparison to the immense-fields which only require the active arm of the intelligent laborer, to be transformed into the richest fields of wheat. On the other hand it is proper to insist upon the fact, that the pampas against which it is attempted to raise

but feeble objections which fall by themselves, are far from extending over the whole country; on the contrary the greatest part of the Argentine Provinces owing to the formation of the land, have nothing in common with the pampa which properly belongs to some Provinces only, situated upon the banks of the Paraná river. For the rest, we cannot sufficiently repeat that the Argentine Republic extends from the 56° to the 20° S. Lat. and consequently is subjected to a variety of climateric conditions, which furnish in turn an equally great variety of productions. Let us add also, that our mountains gradually rising to the limits of eternal-snow, it will be acknowleged that, in declaring that the Argentine Republic can furnish all kinds of products, we only advance an undeniable fact. Our Southern Provinces are destined to become an inexhaustible granary, whilst the Provinces of the Center and North, offer the greatest advantages for raising the productions of the temperate and torrid zones. In Tucumán, Salta, Jujuí and Corrientes, sugar-cane prospers in great perfection which is proved by the sole fact that notwithstanding the actual empirical method of cultivation, and a manufacture even less rational, the sugar produced in Tucumán and presented at the exhibition of Córdoba, was declared by chemical analysis to be superior to that of Brazil.

There are districts of perhaps some hundreds of square-leagues, in Salta, the Chaco, Misiones and the Province of Corrientes, appropriate to the cultivation of cotton. Liverpool brokers have declared that cotton from thence is superior to the best produced in the South of the United States.

In the same districts as well as in Tucumán and Santiago, the cultivation of rice will some day be of great importance; nor can it be doubted that but few years will pass ere the production of tobacco in the Republic, will compete with that of the United States as to quantity, and as to quality with that of the West-Indies.

The pampas, and still more the so richly-watered soil of Entre-Rios, foretell a great future for the cultivation of oil-producing plants, especially the colsa; and the olive prospers magnificently throughout the whole country except the extreme South.

The culture of the vine is of yet greater importance, although as yet indigenous wine is rarely found in the coast-towns. On the one hand the wine product of Mendoza, Rioja, Catamarca and San Juan, is consumed there or in the neighboring Provinces, whilst on the other, the must is made with so little intelligence, that the wine will not in general support long voyages. Even in California the vintages had to struggle for some time against similar difficulties, and as yet, few experienced persons have been occupied here in this promising business. The culture of the vine

and the preparation of wine are in general the same as they were in the time of the Spaniards, one or two hundred years ago. Without doubt the vineyards have degenerated in great part; they ought therefore to be renewed by plants from Europe, or better yet from California, but it would be still better to propagate among the vintagers a knowledge of this branch of cultivation. The National Congress during its session of 1875, passed a law to establish practical schools for this purpose, to be presided over by competent persons brought from abroad.

The vine is only cultivated in a relatively large scale in the above-mentioned Provinces, but it is not doubted that it will succeed and give a flattering result in all the others, should it be well cultivated. Messrs. Claraz and Heusser, whom we have more than once mentioned in the preceding chapter—"The conditions of vegetation"—possess flourishing vineyards is one of the most Southerly parts of the Province of Buenos-Aires, in immediate proximity to Bahia-Blanca. The Province of Entre-Rios and a part of that of Corrientes, are particularly adapted to the culture of the vine, and doubtless in time, the Sierra of Córdoba will become a real wine-making country; the wines of the above-mentioned Provinces already enjoy the best reputation among those who consume them.

The small consideration which is given here to the tillage of the vine and other fruits, does not arise from the fear of labor being lost, but rather that some time must elapse before it can produce favorable results. It is the prevailing desire to have quick profits, and therefore, there is less inclination to invest money and labor in a business which requires years to give returns, than to raise cattle which it may be said, do so almost immediately.

An appropriate soil for breeding silk-worms is found throughout nearly the whole extent of the Republic; the successful attempts which have been made in several of the Provinces speak for us in this respect. They prove that this branch of rural economy will have a future only the more brilliant, inasmuch as it does not require heavy work, but may rather be considered as a domestic task; consequently the women and children in the families of husbandmen, can dedicate themselves to this occupation, whilst the men are engaged in tilling the fields, as now happens in many families of the agricultural settlements. That of San Carlos in the Province of Santa-Fé, is especially distinguished in this branch of industry, and already exports silk-worm eggs in considerable quantities. The mulberry grows magnificently in this country, and moreover our forests—it is said—contain several species of indigenous trees, whose leaves are a most proper nourishment for the silk-worm.

In the Northern Provinces, plantations of coffee will be most

profitable, and the cultivation of medicinal herbs, of dye-stuffs and fibrous plants, presents a vast field as yet completely neglected.

In view of the overloaded peach-boats which come in summer from the Islands of the Paraná, and the immense number of oranges which are sold in the city of Buenos-Aires in winter, it cannot be denied that fruit-culture were it properly attended to, would be of great importance. The peach-tree has become wild to a certain degree; it is planted every-where in the country, not for its fruit but for fuel for domestic purposes, on account of its unusually rapid-growth which permits it to be cut in three years from planting the seed. It and the orange-tree, are wild in the Islands of the Paraná, where the two trees form impenetrable forests in entire districts; a decided proof that both the soil and the climate agree with them in the highest degree. An intelligent fruit-culture is almost unknown throughout the country, and this branch of rural economy is followed in the Interior as a simple routine, because fruit dried in the air—especially the peach, fig and grape—forms their chief export. Also some indigenous fruits are gathered there, such as the Algarroba—species of *Prosopis*—and the Tuna—a species of *Opuntia*—which serve to a considerable degree as food for the inhabitants. But as we have said, there is no proper cultivation of fruit-trees in the country; some nurseries are planted here-and-there in the virgin-soil when there is time, composed of widely separated bushes which increase with extraordinary rapidity; thereafter, all care of the tree is abandoned; they are never grafted or pruned except in a few orchards near the markets, where some nut-trees are also cultivated.

We ought also to mention the cultivation of pumpkins and water-melons which is relatively very important, but the method employed are excessively rudimentary. The consumption of these fruits in the country is something really astonishing, because the Argentine in general is passionately fond of them, expecially when preserved in a great quantity of sugar.

The supposition however, that this well-marked predilection for sweet-meats which belongs to all classes and ages, would have originated an important manufacturing industry, is without foundation; they are content with the domestic article sometimes excellent it is true, but the greatest part comes from countries much less favored by nature than ourselves, which annually occasions the remission of considerable sums abroad. Yet it cannot be denied that not only our own wants could be abundantly supplied, but also, that we could export considerable quantities; because this industry promises golden-harvests to those who possess the knowledge and capital necessary to undertake it. Establishments for the preservation of fruit and vegetables properly located, *i.e.*, near a navigable river, in the Provinces of Corrientes or Entre-Rios

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the Chaco or the Misiones,—and managed with the skill which is every where indispensable, would give infallible and brilliant results.

We should be too prolix were we to mention all the crops appropriate to the qualities of the soil and the climate of the Argentine Republic; what we have already said evidently suffices, to prove that our agriculture in its subdivisions, will be most brilliant in the times to come. The rule moreover, which we adopted in writing this book, not to make arbitrary deductions or assertions destitute of proof, prohibits us from describing at greater length the rural future of our country.

Certainly we could have mentioned that great districts in the Interior are covered with the cochineal-cactus, and that the raising of the insect so highly esteemed for its coloring-matter is of no importance in Tucumán, Catamarca, Santiago and Corrientes, because the method of preparing it is against all the rules. We could also have spoken about the *mandioca* root, as well as many other varieties of useful plants.

For the purpose of comfirming what we said before, we will only mention the cultivation of table-vegetables and flowers, in which the Argentines show great zeal; all leguminous plants succeed perfectly, and the markets of our large cities always offer a rich selection. It is true that in certain epochs only the rich can purchase them, because, owing to the scarcity of the manual labor which is much required in raising them, the prices demanded and obtained are very high.

In all the cities of the country there is in reality not a home that is not more or less adorned with flowers in its interior court, which is always surrounded with apartments. Unfortunately less attention is paid to the indigenous Flora, which—we have said in its respective chapter—is so beautiful, than to the plants from abroad. The camelias are favorites above all, and various conifers —such as the Araucanians—the cape jasmins—*Gardenias*—and the perfumed *Diamela* are rarely wanting in these *patios*—courts.

A garden of acclimation and experiment has latterly been founded under the direction of the Chief of the Department of Agriculture, which will doubtless, powerfully contribute to elevate agriculture, by a spirit of emulation based upon practical proofs of the best manner to treat well-known branches; as also, upon the introduction of new species of plants adaptable to special parts of the country. But the principal want of Argentine agriculture is a sufficient amount of intelligent labor; *i.e.*, a continual and numerous stream of husbandmen. This want is recognized by the Government and people, who—as proved in the immigration project we will by and by mention—are ready to make any apparent sacrifice to this end, as they are convinced that it would only be a lucrative investment of their funds.

Agricultural statistics are wanting as yet, so that we cannot give any sketch of our actual productions.

In view of the scarcity of forests in the Province of Buenos-Aires, many persons believe that the whole Republic is poor in timber; a supposition which is apparently justified by the fact, that we import large quantities of lumber for all purposes. It is not so, however, as has been proved at length in Chap. VII; nevertheless, we have hardly mentioned there the principal forest-regions such as the Province of Corrientes, and the territories of the Chaco and Misiones.

It is easily understood that in a country as young as our own, many branches of the administration cannot be as well-managed as in those countries a thousand and more years of age; thus it is not astonishing to see that forest-economy does not exist among us. On the contrary we have to deplore the indifference displayed towards the unreasonable method of clearing large districts of trees, without having obtained any great advantages from these clearings. A giant of the forest is abandoned to certain ruin, simply, because a part of its bark is required for dyeing or tanning purposes; again a tree is felled, because its tenderest branches are wanting.

In some parts of the country the destruction of forests is carried on designedly; the proprietors of the land let their forests, that is, they let the explotation or free-usage for a settled term; the lumberers have therefore, no other object than immediate profit, and fell the whole forest. No one dreams of replanting it, the proprietor is satisfied that he has received a profit in many cases greater than the value of the land itself, from which he still expects a return after the term of the lease. Even the mine-owners have contributed to despoil the wooded-districts; but in this case the punishment was not long delayed, because many very lucrative founderies have been abandoned for want of fuel.

In the forests of the State any person can fell anywhere, all the timber he wants; here and there, the lumbermen pay a small impost which only serves at best to augment the resources of the State, but in no wise hinders the disorder. This might be explained—although never excused—if a sufficient profit were obtained, but not even is this the case. Entire forests are destroyed containing the most precious woods; yet meantime, not only the simplest furniture but also lumber for all purposes are imported. The disorder is so great in this matter, that we must even consider it as a step in advance that charcoal is made, and some timber for ship-building is prepared.

We will not here examine the question, whether in a State where the Constitution guarantees the greatest individual liberty, legislation is authorized to restrict the rights of private property,

but there can be no doubt that the public domain is directly subject to legislation, and that its duty is to prescribe a usage which responds to the general interests, and consequently to prevent the destruction of the forests on the public-lands.

We would not say by this, that the forests ought to remain intact. On the contrary their rational explotation is as equally beneficial to all the world as their destruction is injurious. Nor should we forget to say here, that enlightened and well-intentioned persons have often raised their voices against this pitiless destruction of the forests, and the Department of Agriculture allows no occasion to pass of demonstrating to the country, the damage it is suffering. These warnings acquire more force from the recently published fact, that in the tropical countries of Brazil frequent night-frosts have caused great damage to the coffee and sugar-plantations, on account of the unreasonable destruction of the forests.

These warnings—although not in an entirely satisfactory manner—have nevertheless obtained some success, inasmuch as they have caused our National Authorities as well as those of Buenos-Aires, to offer premiums for the planting of nurseries. The first step of the State to create new-forests will be followed by another decree to preserve the forests of the public domain. Nor is it the State only which gives importance to the planting of nurseries; in the Province of Buenos-Aires a lease is rarely executed without the farmer has bound himself to plant and cultivate, a certain number of trees. It would be uselesss to mention here the beneficent consequences of these efforts; we will only state that the Lombardy-poplar planted on a large scale in the Province of Mendoza, has given magnificent results even in a pecuniary sense; a convincing proof of the facility of creating a vigorous vegetation of trees, in those of our regions as yet destitute of them."

As we have already remarked, Chap. VII makes no mention in this respect, of the most important parts of the Republic, which are central and lower Chaco, Corrientes and the Misiones. The most ample details have been given about the woods of the interior Provinces so far as they are known to science, therefore we will give here some information about several of the principal varieties of Corrientes; the Chaco and Misiones, are as yet unknown in great part.

We cannot give the scientific names of the trees, not even those which have been already classified in Chap. VII, because in the different parts of the country the same popular name is given to forest-plants which differ more or less, and which in many cases, have nothing in common save the indigenous name.

Ivirapitá-miní—the small-Ivirapitá—specific weight, 0.878 kilog. grows in preference in the dry-districts. Its wood is red; the

leaves are from 3 to 4 centimetres long, and the flower, as large as a pink, is colored a bright-red. The wood is specially fit for ship-building, and its timber is offered in the market from 6 to 10 metres long + 25 to 30 centimetres.

Quebracho-colorado—specific weight 1.234 kilog.— One of the most numerous forest-trees; its wood is the commonest in the market, and no other surpasses it in solidity; it is employed as well in house as in ship-building. In commerce the *Quebracho-colorado*—which is also called the Iron-oak—is sold in timber from 6 to 8 metres long + 30 or 25 centimetres thick.

Lapacho—specific weight 1.012 kilog.—is a tree equally common, of a strongly-compact greenish-wood; it is much in vogue for all building purposes. The tree generally attains a considerable hight.

Timbó—specific weight 0.425 kilog—. A large-tree whose timber comes to market sometimes 15 metres long and 1 m. thick. Its lightness and flexibility render it above all, fit for canoes; its odor is quite disagreeable, and its color resembles that of cedar; its bark is very coriaceous.

Tatané—spec. weight 0.150—is found in all parts of the Province of Corrientes, but always isolated or in small number, so that it is not very abundant. This tree attains the hight of 12 metres + 1 m. thick, of which 3 centms. often belong to the bark. Its wood is fit for fine cabinet-ware, and moreover, has the advantage that it neither swells or shrinks according to the state of the temperature.

Laurel-negro—black-laurel—spec. weight 0.679 kilog., is one of the commonest and cheapest species of timber; the islands especially furnish it in quantity. Its wood is yellow with black-veins, and is almost exclusively used for canoe-making, because the sun easily dries and cracks it.

Guayacán—spec. weight 1.195 kilogs.— There are two species of this wood which are even distinguishable by the ignorant, on account of the difference of their color. Of all the trees of the forest the *Guayacán* has the thinest bark; it is not a millimetre thick: its leaves and yellow-flowers are also small. Its fruit, a pod from two to three inches long, is black and furnishes a dye, whilst the wood is very well adapted for the turner's purposes.

Palo-blanco—spec. weight 1.010 kilog.— This is a large tree whose wood is of a straw-color, whereas the bark is whitish. Although this tree grows to a considerable hight and also attains a great circumference, large timber cannot be procured from it, because the trunk has the appearance of a Corinthian-column being deeply-fluted. Its wood is very-finely grained, and resists friction with such persistence that it is doubtless, the best material as yet known for the construction of ship-blocks.

Palo-de-Rosa—spec. weight 0.700 kilogs.—A tree of great circumference, its wood is of a rose-red color—thence its name; there are two species which are known in the country as male and female. The wood of the first is the hardest and most difficult to polish, and has no veins, whilst the second is a softer-wood of a rather more pronounced-red with magnificent dark-veins, and furnishes to the cabinet-maker a most esteemed material. Although entire forests of rose-wood trees have existed, this precious-wood at present rarely appears in commerce.

Guayaví—spec. weight 0.661 kilog.—a quite common-tree of various sizes, white wood with a black-nut. It has no equal for the manufacture of oars and lances.

Cedro-de-Misiones—spec. weight 0.572 kilogs.— In that part of the Misiones which bounds the Province of Corrientes, three species of cedar are known which are only distinguished from each other by the color of their wood. Forests of this tree as yet intact and of many leagues in extent, await a rational explotation.

Urundey—spec. weight 1.092 kilogs.— Among the woods fit for trade-work this tree occupies the first rank: it reaches the hight of 20 metres + 2 m. in diameter. Its leaves are lanceolated 4 or 5 cms. long + 2 cms. broad; its small flower is white, and its bark which is not very thick, is preferred for tanning hides. There are three species, that is to say of timber of different colors; black with white-veins, black with yellow and white-spots, and although more rarely, having both veins and spots at the same time. It is fit for ship-planks on account of its resinous nature, and house-rafters are almost exclusively made of it. It is also the best for cart-axles, because it resists friction almost as well as the *Palo-blanco*, and is besides, extraordinarily resistant to crushing weight. Timber of more than 12 metres long + 30 or 40 cms. thick, is rarely seen in commerce, because the lumbermen do not fell the largest-trees owing to the difficulty of transporting them.

Petiribí—spec. gravity 0.810 kilogs.—is found on the shores of the upper-Paraná: it is a common tall-tree, and reaches even more than 60 metres in hight. In view of its straight growth and notwithstanding its relative weight, it is used for the masts of vessels; but in our opinion it excells all others for the manufacture of staves. This tree has thick and fleshy-leaves of a clear-yellow color, and the wood, even after being exposed to the influence of water, keeps its agreeable and aromatic odor.

Mora—spec. gravity 0.925 kilogs.—a large-tree which although common, is rarely found clustering in great numbers. Its wood is yellowish, but when polished it takes the most beautiful mahogany color, and perhaps on this account, is recommended to the cabinet-maker.

Carandá—spec. gravity 1.197 kilogs.—a tree rather rare, formerly said to belong to the *Prosopis* species, does not attain a greater hight than 4 or 5 metres, nevertheless its wood strongly resembles the *Jacarandà*, and it is greatly sought after for cabinet-work on account of its dark-violet-color; moreover, it makes excellent lance-shafts and utensils of all kinds. Its leaves are cylindrical in form, and terminate with a very-hard and sharp thorn.

Palo-santo—spec. gravity 1.161 kilogs.—this wood resembles the *Guayacán* which we have already described, although the trees are different. The *Palo-santo* never grows straight, and for this reason its timber is not fit for building purposes; on the other hand it is a most excellent fuel, and is used in popular medicine. It is also very aromatic, its perfume resembling the incense used in the churches; for this reason perhaps, it is called *Palo-santo* or Holy-wood.

Curupay—spec. gravity 0.989 kilogs.—a tree which is quite abundant, and whose bark is specially called the "tanners bark." It is exported in great quantities to Buenos-Aires. Its red-wood crossed with precious black-veins, is used in cabinet-making.

Iviraró—spec. gravity 0.986 kilogs.—comes from the upper-Paraná where it is common; it is the species of Argentine-wood which most resembles the oak of Central Europe. Its use is the same as that of oak in Europe, and its bark is very coriaceous.

Pine-of-Misiones—spec. gravity 0.410 kilog.— As far is yet known, this tropical pine is only found in the virgin-forests of the Misiones, and hardly enters into commerce notwithstanding the excellence of its timber, because more accessible forests offer abundant compensation. In times of great freshets numerous trunks of this tree float down the upper-Paraná, which although they are evidently but fragments, are often more than 20 metres long.

These data, which are taken in part from a monograph of Mr. Frederick Roibon of the city of Corrientes, include about one sixth of the forest-trees of the Province, and, although the details are not very ample and without any scientific merit, they suffice to prove even in this respect, that the Argentine Repnblic has been gifted by Nature.

Cattle-breeding.

The topographical features of a part of our country with its widely-extended plains, is extremely favorable to the raising of cattle on a large scale; for, with the exception of some places where the cultivation of forrage is necessary to their support, in general, the droves do not require any other care save that of gathering their produce from time to time. These millions of horned-beasts, horses, sheep, goats, etc., are nourished by the grass which Nature itself supplies to the pampas, and they also increase without

their proprietors being in any way incommoded. But these natural advantages which are found here, are exactly those which in great part cause the negligence which in our opinion, is attached to this important branch of rural economy, yet in its infancy among us. Every thing is left to Nature, without reflecting that it is necessary to assist it and in some sort to direct it, should we wish to profit thereby. Therefore, it is not a matter of astonishment, if unfavorable conditions of temperature sometimes cause astonishing losses to the breeders, which, although they be soon restored, might nevertheless have been prevented. A more intimate relation between the raising of cattle and agriculture, or the cultivation of forrage to nourish them when a drought has partially destroyed the natural pasturage, would certainly contribute to avoid the losses we have mentioned: and so also, the division and enclosure of the prairies in sections, so as always to give fresh pastures which have not yet been browsed, to the droves. In this respect a commencement has been made with success, and it may be supposed that the system of fencing would already have been much more extended among us, were it not that the want of timber in some of the Provinces makes it a very-costly affair. Yet we remark, that in the United States of North America, the same inconvenience was found, and nevertheless, the cattle-breeders essentially increased their profits by following this system.

Horse-breeding.

In no other part of the world perhaps, has the raising of horses so strict an alliance with the manners of the country, as in the Argentine Republic. The nature of its soil, the exigences of a pastoral life, the great distances to overcome, and finally, the maintainance of social relations between our people so few in number, make the horse an absolutely necessary element; it is not easy to imagine our situation without this animal, the living native-power of the Argentine plains. Therefore it is easily understood that a great number of horses are raised here, for which the country is well-adapted.

According to the American Archives in Seville, Don Pedro de Mendoza was the first who introduced the horse into the regions of the Plata. He brought for the colony which he founded, 16 cows, two bulls, 32 horses and mares, 20 goats, 46 sheep and 18 dogs. Farther on in his memoirs it is related, according to the details given by Ruy Diaz de Guzman, Lozano and Centenera, that Ayola and Martinez de Irala, the chiefs of the expedition, took several of these animals with them to the Interior, and that others were lost in the wastes which are found up the river near the present village of San Fernando, before hunger ravaged the colony

of Santa-Maria—the name of Mendoza's Colony—and compelled the colonists to kill the cattle yet remaining to them. A little later the shephard Goes, arrived in company with Cabeza de Vaca, bringing ten cows and a bull, which were taken to Paraguay.

Afterwards, when the energetic Garay repeopled the colony of Mendoza—then destroyed—from Paraguay and thus became the founder of the city of Buenos-Aires, the fugitive animals then wild had considerably increased, and they formed the stock of the actually innumerable-droves of the States of the river Plata.

From that time to the present day, the increase has gone on in an astonishing manner; but unfortunately, the attention and care which are required for the raising of horses have always been omitted. Some breeders form laudable exceptions which only serve to confirm this reproach, by clearly proving how easy it is to improve the race of horses amongst us.

Thus the race of noble stock-animals inevitably degenerated little by little, although our present horses still possess some of the good qualities of their ancestors. But what has become of the esteemed Andalusian horse from which our horses undoubtedly descend, and which was already celebrated before the birth of Christ?

The glory of having recognized the necessity of improving our breed of horses and of having made the first steps towards it, is due to our great Rivadavia, and the traces can yet be found of the blooded-stallions which he introduced. Even the season of the births is very unfavorable to the raising of the colt, inasmuch as it is in the winter months; thus the tender animal has to undergo the rigors of the summer when the pastures are dried, and the dams from insufficient nourishment, have but little milk; but, were the births to take place in March and April—that is to say, when the new fall-grass springs up, the colt would be strong enough to pass the months of our benign-winters without danger, and would find an abundant and succulent pasturage in the spring, and thus become a vigorous animal.

The establishment and maintainance of stud-farms would doubtless give the best results; severe laws—such as are in vigor in the United States—should also be passed for the purpose of regulating the dropping of the foals as above indicated. If the necessary care and protection were given to this matter, the explotation of horses in view of the extraordinarily favorable conditions of the climate, etc., would soon become of such importance, that all labor and expense would be only too well compensated.

The number of horses and mares in the Argentine Republic, is about 3,960,331 of a total value of $ 17,602,176 in gold.

On Mule-breeding.

In the Provinces of the interior the mule has almost taken the place filled by the horse in those of the littoral, because the physical features of that part of the Argentine Republic enable him to display his peculiar advantages. He is esteemed throughout those vast regions not only as a beast of burden and draft, as well as for the saddle, but also as a weigher of traffic. Moreover, it is necessary to consider the importance of the exportation of mules to Peru, Bolivia, Chile and the Bermuda isles, which produces considerable sums to those who breed them. The number of mules is estimated at 132,125, of the value of $ 2,429,835 in gold.

Mule-breeding requires a greater or less number of jack-asses, which also serve in the interior Provinces as beasts of burden and for the saddle. Although a good stock of these animals would have a direct influence upon the breeding of mules, little or no care is given to this so-well-known and modest brute; less still, is any thought given to the improvement of the race by the introduction of good jacks. Number 266,927, of the value of $ 719.788 in gold.

Of the breeding of horned-cattle.

As is well-known, the Argentine Republic is one of the countries where horned-cattle are exploited on the largest scale; this is a proof that no other presents such advantages for this branch of rural economy, which is an inexhaustible source of private and public welfare. The introduction of choice-breeds in this branch, ought also to be considered as the principal basis for its success, and in reality, such a method on a grand scale would be so profitable, that no better investment of capital could be imagined. To the Argentine Republic should principally belong the good-luck of supplying to the old world its principal alimentary substance—meat—at a moderate price. Butter and cheese ought to be exported in great quantities, but instead of that we annually send considerable sums abroad to buy these articles; for, notwithstanding our millions of cows, the country produces but a small quantity of milk, which is sold for the consumption of our cities; even in the country, in establishments destined to cattle-breeding which contain 20 or 30,000 cows, butter is almost unknown, and milk is a rarity.

The introduction of blooded-animals which require greater and more intelligent care, would make a change for the better; in connection with the establishment of model-farms to teach the advantages of a more intimate connection between husbandry and the breeding of cattle, they would improve and radically reform the

condition of our rural affairs. The number of the bovine race in the Republic is about 13,493,090, which represent a value in gold of $ 84,433,358.

On sheep-breeding.

The importance of this industry is so great in our country, particularly in the littoral Provinces, that were we to consider it in proportion thereto, we would greatly surpass our prescribed limits; we will consequently be content with some summary remarks.

The present condition of sheep-breeding so far as regards the number of animals is so satisfactory—especially in the Province of Buenos-Aires its principal seat—that in truth the country ought to be proud of the progress made in so short a time, and in such a surprising manner: our increase in flocks and wool has never been surpassed, nor yet equalled. According to estimates based upon statistics, the Province of Buenos-Aires alone, possesses more than 45,000,000 of sheep, and annually produces 160,000,000 lbs. of wool. Moreover, when it is considered that this result has been brought about in a few years, it is difficult to depict or conceive the probable condition of this industry in the future. Nevertheless, it is necessary to join the application of physiological principles to practice, for the purpose of completing in a satisfactory manner the refining of our ovine race, if we desire to partake with full assurance, of all the advantages which this lucrative industry holds forth in some of our Provinces. In some respects we are so backward that our wool cannot compete in the great markets of the world, so far as regards the quality, with any other country which is a great producer. The bad habit of our breeders to separate their sheep into large flocks—sometimes above 5000 heads—is the principal obstacle to the improvement of our wool, because large-flocks do not admit of the necessary attention.

The increase of husbandry occurs in the same proportion as the value of land; now, where husbandry is practiced upon a large scale, the pasture land, and consequently also the large flocks, must decrease; the flocks would then be less in number and could be better guarded, and consequently the wool would be better, although it should not be forgotten that quantity is of more pecuniary importance than quality, and that the wool of the Plata notwithstanding its relatively ordinary quality, has an influence upon the price of the superfine wools of Europe.

The really astonishing number of sheep which we possess, is the principal reason as we have said, for this condition of things among us. The increase of animals and the product of wool would then go on *ad infinitum*, but unfortunately a contageous malady iu the flocks—*Scabies oralis*—often hinders this increase.

This scourge of the shepherds was formerly unknown here, and was first introduced some 32 years ago, by some rams imported from England; since then, it has spread abroad and become acclimated among us.

The quantity of sheep in the Republic is estimated at 57,546,448 animals, and their value at $ 84,234,369 in gold.

The attention given to the raising of llamas in this country, is insignificant, although the mountainous regions of our Northern Provinces form a part of their habitat. Only the Province of Jujuí counts among its cattle 16,000 llamas, whose value is $ 40,000 gold. Some intelligent *estancieros* of the littoral Provinces — above all in Buenos-Aires—have latterly made some excellent attempts in their establishments to raise llamas, as well as alpacas.

It is to be deplored, yet more even than the neglect shown to these two animals, that the vicuña, whose wool is so fine and valuable is hunted as a wild-beast instead of endeavoring to breed it in domesticity; its near extermination is almost a mathematical certainty. Where it as yet exists in considerable flocks—for instance, in the Province of Catamarca—at certain seasons of the year, *i.e.*, when these animals have most wool, a battue is organized, and followed by a butchery which can not be sufficiently condemned. The animals are killed by hundreds only to despoil them of their wool. Fortunately the authorities have, at length, become sensible of the injury which this senseless proceeding causes to the nation, and laws have been promulgated in some parts of the Republic, to protect the vicuña; we ought therefore to expect that before long, the act of killing a vicuña will be punished with all possible severity. It is sufficient to shear the animals when caught and thereafter place them at liberty, if it be not desireable to tame and breed them; but their butchery is an act of brutality which ought to be severely punished.

On the breeding of Goats.

Since Pedro de Mendoza, as we have already said, brought the first 20 goats to the river Plata, and thereafter Cabrera introduced them to Córdoba, and Nuñez Prado to Tucumán, the breeding of this useful animal has become of so much importance in our country—above all in some of the Provinces—that their produce essentially contributes to the progress of our manufactures, and to our exports. Saddle-covers are manufactured at Tucumán from the skins of the celebrated goat of Aconquija, hardly inferior in fineness to the covers made from the skins of Angora-goats; it surpasses the latter as regard the beauty of the colors. Large quantities of these skins are sent from Santiago, Córdoba. etc., to Buenos-Aires for shipment abroad.

Notwithstanding the evident advantages which the raising of goats brings to the country, a great neglect of this branch of cattle-breeding is evident every where. The extent to which it is carried and even the easy purification of the breeds, with few exceptions, are exclusively the results of natural causes. The goats introduced from Spain, as we learn from Sr. Ordoñana in his estimable treatise on the subject, belonged to the ordinary species of Gallicia, Andalusia and the Canary Isles, and it was Rivadavia—the greatest statesman of the Argentine Republic—who caused several goats from Angora and Thibet, to be introduced in 1826; these prospered here, but were soon lost owing to the civil wars. Several persons, however, decided to repeat the experiment of Rivadavia, and the brothers Ledesma in 1865, established the first flock of Angora goats in the Province of Córdoba; they merit an honorable mention. We likewise name Mr. Chas. Barker, who shortly afterwards introduced Angora goats from the Cape of Good Hope, and exploits their produce with intelligence and success, at his farm in Córdoba, called "Las Peñas," already become celebrated.

The Province of Corrientes also sent to the National Exposition of Córdoba, samples of Angora fleece; not only the raw, but also the worked-skins, as well as the living goat itself, could be seen there.

There is no doubt whatever, that with necessary care the breeding of Angora goats could be made of incalculable importance here. Dr. Ordeñana, an authority on the subject, says that the goat of Tucumán is one of the finest and best of breeds: it resembles the Himalayan goat in form and anatomical structure, but surpasses it in value, because it gives a hair from 12 to 16 inches long. European connoisseurs to whom samples of this hair have been presented, could hardly find words to express their astonishment at its beauty. The Department of Agriculture—as also Dr. Ordoñana—are of the opinion therefore, that the products of the cross-breed between the Angora and Tucumán goats, would surpass in all respects those of any other breed. Actual number 2,863,227; value $ 2,710,756 in gold.

On the breeding of Hogs.

The Hog prospers very well here like all other domestic animals, and we can say with satisfaction that during late years hog-breeding has constantly increased, although the product will not be sufficient for the wants of the country for a long time yet; thus we are obliged to import ham, lard, etc., whilst we ought to make a considerable export of these articles. Some land-owners have imported the breeds of Berkshire, Suffolk and Yorkshire, for the purpose of improving our own. Number of hogs 257,368; value in gold $ 617,868.

On Poultry-breeding.

At the present moment there is not in the whole Argentine Republic a single establishment for the raising of domestic-fowls, although every person ought to be persuaded that it would give a handsome revenue. In our mild-climate all species of fowl succeed admirably; they increase on a grand scale and always bring high prices in the market, as those who inhabit our most important cities know to their cost. In the country, every human habitation has a greater or less number which contributes to animate the surroundings, whilst on the farms and kitchen-gardens in the environs of the cities, chickens are found in flocks, each one some times containing hundreds. Yet no one is occupied in the exclusive breeding of these domestic-animals which are so productive and tame. Once in a while in harvest time, a little maize is thrown to them, and a species of stable or place of repose under a roof, is made for the night, but in general, they are left to themselves; they are thus half-wild and would become entirely so, were it not that their habits retain them near the places of their birth, *i.e.*, the habitations of man. The scarcity of eggs which is often felt, because the owners themselves do not often know where to find the nests, is one of the results of this neglect. The hen sets when instinct calls her, and for a long time thereafter, lays no more eggs. But, inasmuch as the consumption of eggs in the cities is important and constant, they are in much demand, and sometimes cost as much as 8 cents apiece. The price of a full-grown fowl varies from one dollar to one and a half dollars. In the country-districts the turkey and the pigeon are also found in great numbers; ducks and geese are not so abundant.

As we have seen in Chap. VIII of this work, there are several species of indigenous fowls, such as pigeons, geese, swans, etc. Efforts to tame them have never been made, although success would not be doubtful. It would even be very profitable to add the *Martineta* to our domestic-poultry, as its flesh is very sweet, and somewhat characteristic of both the partridge and the pheasant.

On hunting and fishing.

In some parts of the country the chase offers to the zealous Nimrod, as yet unexplored districts, full of game worthy of his skill. The hunter who has even wandered the length and breadth of the world, cannot imagine the size of the flocks of aquatic birds which frequent our solitary waters, whether still or running, above all in the forests; nor yet the infinite number of pigeons and parrots which surround the traveler in the Provinces of the North and Center, and the crowds of partridges which he meets at every

step, flying in the prairies. The quadrupeds of the chase are less frequent although they certainly are not wanting; in some districts deer, roebucks, the hare of the pampa, guanacos, armadillos, tapirs, etc., are found in quantities. Those who desire still larger game can follow the lions and tigers—the princes of the feline race—but yet little dangerous here; and the chase of the ostrich, is an infatuating pleasure to the hunter on horseback.

There is an abundance of fish in almost all the running waters of the Republic, but they have never been exploited, thus to say, at least for any industrial purpose. We receive great quantities of fish, dried, pickled and preserved in oil, from Europe, especially during the fasts of the Roman Catholic Church, when we ought instead, to export considerable quantities.

The better to characterize the chase and fisheries among us, it is sufficient to say that up to the present time no legislative decision has been taken upon the subject; but we expect that this neglect of our National legislation will be examined and remedied, because, many races of animals of great value will be exterminated, should the present customs respecting them be not interdicted.

The explotation of an Estancia.

Before terminating this chapter, by a comparative table of the cattle in the Argentine Republic, it is well to insert here, a short numerical statement of the product of an establishment—called in this country an *estancia*—destined to the raising of cattle. This one is based upon the relative condition of such affairs in the Province of Buenos-Aires, where the breeding of cattle is better understood, and where the pampa has attained a relatively-high value which demands therefore, a larger capital. A league square of pasture-land according to position, *i.e.*, the distance from the city, costs from 20 to 50,000 dollars in gold; the necessary buildings are included, which as a general thing, are quite primitive and cost but little. Let us suppose that the price of purchase be $ 40,000, and that $ 20,000 is destined to the purchase of cattle as follows:—

10,000	sheep *al corte* *	at $ 1.10	=	12,000
1,000	horned-cattle	„ 6.	=	6,000
300	mares.....	„ 4.	=	1,200
50	saddle-horses for the use of the establishment	„ 16.	=	800
				$ 20,000

* *Al corte* means "at the cut off," and is an expression which owes its existence to the custom at the time of purchase, of separating a part of the flock containing old and young, at hazard as to the number of head, and the pur-

The capital fund will then be $ 60,000 in gold, whose mean annual product will be as follows:—

2,500	sheep sold to the tallow-triers at	$ 2.	=$5,000	
1,000	„ *al corte*	„ 1.20	= 1,200	
150	horned-cattle for the butcher	„ 14.	= 2,100	
100	„ *al corte*	„ 6.	= 600	
25	mares „	„ 4.	= 100	
	Augmentation and product of the year		$ 9,000	
Also 400	quintals of wool at	$ 12	= $ 4,800	
3	„ „ hair	„ 20	= „ 60	4,860
	Gross-proceeds			13,860

The expenses to be deducted are:—

Salary of the manager, per ann.	$	240	gold	
„ „ two servants	„	280	„	
„ „ six shepherds	„	1020	„	
Sundry expenses	„	320	„	$ 1,860

Consequently, we have a net gain in gold of $ 12,000, or 20% per annum on the capital.

We have expressly taken the lowest estimate here, whereas in general, the product of capital employed in *estancias* is 25%, and often an income of more than 35% is received.

At first sight it is to be remarked, that there is no item for food among the expenses; this however, is perfectly correct, because the animals on the place furnish the aliment which is almost exclusively meat, and the sale of the skin, hides, tallow and grease, of the animals butchered for consumption, richly pays all other small expenses. It is exactly in the absence of all expenses that the principal gains of rural explotation are found in this country. During the first years the *estanciero* has to submit to all kinds of privations, or at least, necessary restrictions; thereafter, he reaches a position of easy, and often of great, wealth.

Although the income of capital employed in an *estancia* may be very great, there are other reasons which render this branch of industry very lucrative and certain. In the first place it is proper to count upon the increase in the value of the land, which, taken

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chaser is obliged to take the quantity of cattle "cut off", at the price per head fixed before hand, whether the animal be old or young, healthy or not. At present it is more usual to put the animal into the *corral—ing.* enclosure—where the door is opened only enough to allow the escape of one at a time. The animals are then counted as they pass by the parties interested, and the number being filled the door is closed.

at a low figure, is 6 % per annum. Whilst the interest of money is 12 % per annum, the proprietor often only counts 6 % as the product of his pasturages, and as much more as the increased value of the land; although it would be easy to prove by examples, that the value of well-situated *estancias* has doubled. To this natural advantage—that is to say an advantage which has cost nothing—the certitude is added of the increase in value of the flocks by an intelligent explotation. A sheep-breeder, for example, no matter how inattentive he may be, will value his sheep at cost price say $ 1.20 per head, but in six or eight years they will be worth $ 1.60 or $ 1.80, and naturally he will also procure better prices for his improved wool, inasmuch as the wool of well-governed *estancias* is sold in Buenos-Aires at from 16 to $ 20 gold, per quintal.

In general the business of an *estancia* offers a vast and productive field to an active and far-seeing man. Do we not perceive that cattle-raising is as yet only too much fettered by routine. and that there is great opportunity for improving the whole system? On the other hand, these innovations cannot be introduced here simply at random, because they have produced wonders in Europe; it is necessary to take into consideration the different circumstances which exist here and mould them to the improvements contemplated. As an instance of our meaning, we will mention that an attempt to raise sheep on the frontier-lands would produce bad results nine cases out of ten, because experience has proved that a long-grazing by horned-cattle is necessary to prepare the land for sheep. Here—as everywhere—experience ought to march *pari passu* with theory; that is to say, it ought to serve as the basis.

It is also evident that many useful animals could, and ought to, be acclimated here; for instance the camel, which would find, above all in our "Monte" districts—see Chap. VII—every condition for a prosperous future. The raising of these animals on a large scale, would serve to utilize larger extents of country as yet unprofitable.

The following table of the present state of our cattle does not pretend to be exact, but it will enable the reader to form an opinion of the proportions which cattle-breeding has taken in the Argentine Republic. Inasmuch as we have no rural statistics, this table is made from data taken in part by the Agricultural Department in 1873-4, although it is proper to mention that in several Provinces—such as Córdoba—the figures of all the districts could not be obtained. Those who know the difficulties of procuring statistics of any kind in a new couhtry, will cheerfully recognize the indefatigable zeal of the Department to which, we owe a portion of the following interesting figures.

We should premise moreover, that the values which are mentioned are those of flocks and droves taken *al corte*; therefore, they are in reallity much higher, not only on account of the imported blooded-animals, but also of those which are broken to the saddle, to draft, and as carriers, which have not been estimated. Again, several years have passed since this estimate was made, and the real figure is in consequence much higher, not only in number but also in value, which latter may be taken at $ 250,000,000 in gold.

The value of cattle in the Argentine Republic in proportion to its population, is therefore, equal to $ 100 per inhabitant.

TABLE OF THE CATTLE IN THE ARGENTINE REPUBLIC

Provinces	Horned-cattle.		Horses.		Mules.		Asses.		Sheep.		Goats.		Hogs.		TOTAL Value
	Number.	Value Hd.-dollars.	Number.	Value H.-dollars.	Numb.	Value H.-dollars	Numb.	Value H.-doll.	Number.	Value Hd-dollars.	Number.	Value. H.-dollars	Numb.	Value. H.-doll.	Hard-dollars.
Buenos-Aires...	5116029	28649762	1534678	6138712	5280	63360	745	4740	15511358	72818172	3770	5278	171056	342112	108022136
Entre Rios.....	2500000	13750000	1000000	4000000	7890	78900	3250	9750	3000000	3600000	?	?	13000	32500	21471150
Santiago .....,	1200000	9600000	130000	1040000	12000	280000	16000	64000	1200000	960000	2000000	1600000	12000	36000	13580000
Santa-Fé	1100000	7900000	250000	1000000	4000	67200	1700	5750	4500000	3600000	15000	18000	9000	57020	12647970
Corrientes.....	1768708	9728000	465935	1836740	6760	53840	12746	38238	778456	878000	8592	12800	6891	10673	12585291
Córdoba.....	652470	4315000	164310	671156	14981	178200	42495	67616	1405638	1060000	368089	269000	8310	25403	6586375
Tucumán.....	305228	4043844	64626	601024	8958	179160	3317	7980	115187	138224	15000	12000	3000	24000	5006232
San Luis	248344	1993752	204492	1022460	17565	263475	45503	182000	113815	170000	181741	272600	7387	22570	3919857
Catamarca.....	200543	2250000	27563	287620	18404	441696	29121	46592	114420	145000	117248	122000	8706	24348	3317256
Rioja.....	72043	1275000	14719	211952	11607	224946	42127	101104	53932	108000	29950	275000	1950	12510	2208512
Mendoza.....	64878	820000	44657	266056	7970	236284	3628	6530	53856	94500	21200	26500	3250	12103	1461975
San Juan.....	28561	675000	26700	151200	11136	267264	6240	14976	120200	285000	20600	30000	5420	8500	1431940
Jujuy	93276	640000	21049	221256	3762	61760	41505	116512	514621	331473	25637	22578	1053	4897	1398476
Salta.....	143010	1000000	11600	127000	1875	33770	18550	54000	64930	46000	56400	45000	1345	5230	1310980
Total....	13993090	86633358	3960332	17604176	132125	2429835	266927	719788	57546448	84234369	2863227	2710756	257368	617868	194491150

CHAPTER XVII.

MEANS OF COMMUNICATION.

WHOEVER may have travelled some twenty years ago throughout this Argentine country, and at present casts a glance at the map of its railways which is annexed to this chapter, must acknowledge with surprise the imposing progress in this branch, that our Republic has a realized in so short a period.

At that time it was not pleasant to travel here. If the voyager from Europe habituated to its facilities of movement, could not or would not, follow the habit of this country to pass days and even months in the saddle, and thus cross the considerable distances which separate one center of population from another, he was obliged to hire a carriage, or go by the post which did not always perform its service with regularity. In these two latter cases his expenses were not only much greater, but he was also exposed to all kinds of fatigue and discomfort, and compelled to take with him almost an entire *ménage:* bed, table-furniture, and above all, food. No one spoke of travelling on foot; even now the poorest Argentine can not resolve to go the shortest distance in this manner, except by compulsion. The caravans of ox-carts as yet exist which communicated between the Interior and the littoral Provinces, although they are seldom used for reasons easy to understand, inasmuch as they were, and still are, drawn by oxen, and only make six or eight leagues per day; to travel between Mendoza and Buenos-Aires—certainly one of the most fatiguing voyages to be imagined—entire months were consumed. A trip might also have been made with beasts of burden—called here a *troop of mules,* in contradistinction to a *troop of carts*—, but the voyage would not have been much more agreeable. It is true it would have been more prompt, but at the same time subjected to bad weather, no one could rely upon any shelter as is usual in

Europe. On account of the animals halts were made where pasture and water were found, and tents not being used, there was no other choice but to throw your saddle on the ground and to stretch your tired limbs upon it. This is why horses are of such great importance to the Argentine. Habituated to riding from his infancy, he makes more than thirty leagues per day without fatigue: nor is this difficult in view of the great quantity and good paces of the horses. Upon all the routes post-houses—as they are called —are found, from four to eight leagues apart, which furnish a change of saddle or draft-horses and also a guide, the remuneration for which is fixed by the State; each station is obliged to furnish hospitality for the night. The Argentine however; is not fond of this State institution. He prefers to take from the commencement of his voyage a sufficient change of saddle-horses, called a *tropilla—ang.* a little troop—and drive them, before him along the route. He is thus independent and travels much faster. This method of travelling gave rise to the invention of the saddle called *recado,* which is composed of many parts, particularly of pieces of leather and raw-hide and three or four covers, with which the horseman makes his simple-bed at night.

But, admitting that in this manner the traveller overcame considerable distances with promptitude, because in view of a hardy people like the Argentines, its inconveniences are of such small considerations that even women, children and old persons bore them without hesitation; the difficulties of mercantile transport were of such a nature that they oppressed commerce most sensibly, and consequently hindered the development of industry.

Inasmuch as several months always passed before the reception of the merchandize demanded, or before the products of the country arrived in the market, the merchant was entirely unable to make his calculations or speculations; he was obliged therefore to operate entirely by routine, and this in turn influenced the education of the people. What benefit could the producer or the merchant expect from a better education, when he could not use it in any sense; a capacity to instruct his factor in the coast-city to sell and buy for him, being all that he required. Any calculation upon the chances were beyond his power. It need not be said that business on credit and bills of exchange were equally unusual, and that the commerce of the Interior with the ports, was limited to a system of barter.

The merchant in Mendoza or Tucumán sent to his correspondent in the port-city the produce which he had gathered during the year, and received against it foreign merchandise. Sometimes he decided to sell his produce and to make his purchases in person; but this direct contact of the inhabitant of the Interior with those of the port-cities, did not always help to fortify his national

sentiments. The latter believed himself in all senses to be the superior of the simple inhabitant of the Provinces, and pretended to hold a supremacy, a species of political hegemony, over him, which he was unwilling to accord. He was conscious of his real value and his equality in rights, but he could not conceal from himself the fact that he was less favored than his fellow-citizen who lived on the borders of the river Plata. In this, he saw only an injustice, and this feeling increased from time to time even to bitterness, when he imagined that he was not received with the consideration due to him.

The civil wars which formerly afflicted the Argentine Republic, were due in great part to the want of means of communication, which prevented the increase of the prosperity of the Interior in an equal ratio with that of the coast-Provinces, and this gave rise on the one hand to a sentiment of pride, and on the other to a species of envy.

The creation of a system of communication became a question of the highest political importance to the Argentine people. Railways, telegraphs and roads, are of double importance here. They are destined to reanimate commerce and industry, even to give birth to them in many districts of these extensive lands, and to form central-routes carrying progress in every sense, to the farthest confines of the Republic. At the same time these iron-roads represent so many bonds which strongly unite the 14 Provinces, whilst a community of interests, in part created and in part fortified by them, will be the material substance to inculcate more complete homogeneousness, better even than the federal Constitution.

The Argentine people are fully convinced of the importance of completing their system of railways; and this conviction explains the earnestness which the country has given to the task.

Millions are annually employed in the continuation of railways already commenced, and no session of Congress takes place without voting some new project which promises to advance the interests of the country, with the solid guarantee of 7 $\frac{0}{0}$ upon the capital required in its construction.

The adjoining map shows that we have railways in construction at widely separated points where commerce, industry and even the explotation of the natural resources are yet to be encouraged. There is therefore, no probability that they will cover the interest guarantied for some years. Nevertheless, Congress, the Government and the people, have cheerfully given their consent to burden the present generation with these charges, that those of the future may draw the advantages.

This is the view to take of the construction of more than one of the railways in the Argentine Republic. They owe their origin

less to the actual exigencies of commerce, than to the serious determination of the people to secure a grand future to their country.

Twenty years ago the locomotive had not commenced its competition with the indefatigable Argentine horse, and already 2000 kilometres of rails are open to commerce, to wit:—

	Guages. ms.	Length in Kilometers.
Central Argentine Railway—Rosario to Córdoba.....	1,68	396,06
Western Railway — Buenos-Aires to Chivilcoy and branches.....	1,68	174,69
" " —Branch from Merlo to Lobos....	1,68	68,43
Southern Railway—Buenos-Aires to Dolores.....	1,68	211,39
" " —Altamirano to Las Flores.....	1,68	119,95
Northern " —Buenos-Aires to Tigre, and branch to wharf of San Fernando.....	1,68	28,98
Buenos-Aires and Ensenada Railway.....	1,68	56,50
Eastern Argentine Railway—Concordia to Monte-Caseros.....	1,44	154,56
Andine Railway—Villa-Maria, Rio-Cuarto and Villa Mercedes.....	1,68	254,38
Primer Entre-riano Railway—Gualeguay and Puerto Ruiz.....	1,44	9,66
Central Northern Railway—Córdoba and Tucumán (the 3 first sections to Las Cañas.....	1,00	399,28
Buenos-Aires and Campana Railway.....	1,68	77,28
In operation 1211,3 English miles or....		1951,16
Railways in construction:		
*Central Northern Railway, 4th section from Cañas to Tucumán.....	1,00	141,00
Southern Railway, continuation from Las Flores to Azul.....	1,68	99,82
Santa-Fé Colonies Railway.....	1,68	96,60
		337,42
The competent authorities have given the concession for the construction of the following railways:—		
Southern Railway, branch from Cañuelas to Tandil..	1,68	135,24
Western " extension from Chivilcoy to Junin.....	1,68	90,16
" " estension from Chivilcoy to Bragado †.....	1,68	51,52

* Ought to be opened in March 1876.

† Already in constructlon.

	Guages.	Length in Kilometers.
Las Heras, Navarro y Veinticinco de Mayo Railway —Province of Buenos-Aires)	1,68	120,75
Buenos-Aires and Rosario Railway	1,68	298,66
Branches of same line to Zárate, Baradero, San Pedro, Rojas, Arrecifes and Pergamino	1,68	388,82
Santa-Fé Colonies—Province of Santa-Fé—Railway	1,00	60,00
Buenos-Aires and Rio Lujan Railway	1,68	64,40
Belgrano and San Fernando Railway—Province of Buenos-Aires	1,68	19,80
Gran-Chaco Railway—Rosario, Colonia Esperanza and Santiago del Estero	1,68	713,23
Eastern Argentine Railway, 2d section, Monte-Caseros to Mercedes—Province of Corrientes	1,68	33,80
Patagones and Salinas Railway—Province of Buenos-Aires	1,44	146,51
Uruguay and Paraná Railway—Province of Entre-Rios	1,44	249,35
Concordia, Campichuelo and Gualeguaychú Railway—Province of Entre-Rios	1,44	199,64
Interoceanic-Trasandine Railway, 1st section from Buenos-Aires to Villa-Mercedes—Provinces of San Luis and San Juan	1,00	1165,64
Id. id., 2d seccion, San Juan, Mendoza to the Chilean frontier	1,00	257,60
Corrientes and Mercedes Railway—Province of Corrientes	1,00	235,06
Argentine-Bolivian Railway—Punta del Negro to Bolivian frontier	1,00	434,70
Córdoba and Saldan Railway—Province of Córdoba	1,00	19,32
Total under concession		4704,40
Congress has declared the construction of the following lines:—		
Totoralejas, Rioja and San Juan Railway—from Córdoba—with a branch to Catamarca	1,00	708,40
Tucuman and Jujuí Railway, with branch to Salta	4,00	354,20
Total		1062,60
We will only mention the following, among a large number of projected railways which have been solicited from the competent authorities:—		
Western Railway, extension from Bragado to Nueve de Julio	1,68	53,13
" " extension from Lobos to Saladillo	1,68	80,50
Junin and Rojas Railway—Province of Buenos-Aires	1,68	40,25

	Guages.	Lhengt in Kilometers.
Ensenada and Magdalena Railway—Province of Buenos Aires	1,68	41,86
Azul and Bahia-Blanca Railway—Province of Buenos-Aires	1,68	338,10
Bahia-Blanca and Salinas Grandes Railway—Province of Buenos-Aires	1,68	241,50
Trasandine Railway from Buenos-Aires, Chivilcoy to Planchon	1,68	933,80
Cañas—a Station of Northern-Central—and Santiago del Estero	1,00	93,38
Dolores and Tuyú Railway — Province of Buenos-Aires	1,68	70,00
Dolores and Tandil Railway—Prov. of Buenos-Aires	1,68	170,00
Santa-Fé and Córdoba Railway	1,68	342,93
Total about	—	2405.45

On account of the commercial crisis which reigned in 1874-5 in the country, and especially in Buenos-Aires its principal commercial entrepot, it is certain that the execution of a large number of these railways is postponed; but in view of the brilliant results which, notwithstanding our present difficulties, the railways of the Province of Buenos-Aires—and in proportion all the Argentine railways—have produced during these two years past, there is no doubt that private speculation will ever more and more, lay hold of a branch which promises such splendid returns; and especially because, the configuration of our country presents no technical difficulties of construction. The Southern railway of Buenos-Aires built and managed by an English-company, is an evidence that foreign capital placed in well-managed Argentine railways, is a sure and lucrative investment: the London Stock-Exchange gives incontestible proof of this fact.

We consider it proper to give some details here about our principal lines.

The oldest Argentine railway is the *Western of Buenos-Aires*, the property of the Province, which manages it through a Directory nominated, by and with, the consent of the Provincial Senate. The tariff of this line—which as public property is not worked for heavy receipts—is the lowest of all the Argentine railways: nevertheless, it made a net gain of 9.61% on a capital of $ 6.105,489 gold, during the year of 1874. The first section was opened to traffic only in 1857 although it hardly passed the suburbs of the city, and in 1867 it was finished to Chivilcoy; the branch from Merlo to Lobos was opened in 1870. According to official documents this road made the following returns:—

Years.	Passengers.	Tons.
1870	739,035	174,638
1871	1,064,207 *	140,484
1872	820,537	151,714
1873	990,484	211,068
1874	961,324	225,455

The earnings and expenses were, in gold dollars:—

	Gross-receipts.	Working-expenses.	Net-earnings.	Dividends.
1870	914,141	514,761	399,380	9,8 %
1871	1,032,958	628,161	404,857	8,61 %
1872	1,081,698	672,138	409,955	8,24 %
1873	1,300,773	961,162	539,611	9,52 %
1874	1,324,872	731,120	593,752	9,61 %

The construction of the Southern railway of Buenos-Aires was granted to an English company in 1862, with a guarantee of 7 % on the cost of construction. Afterwards, this guarantee was compounded for a subsidy of £ 500 per English mile and the privilege of extension and branches, without any further subsidy from the Province. In 1865 the line was opened from Buenos-Aires to Chascomús, and in 1871 as far as the river Salado; the following year it reached Carmen de las Flores. The section to Dolores was opened soon after, and before-long the locomotive will appear in the little country-village of Azúl on the frontier. The capital of the three first sections is $ 5.975,844 gold.

On the section from Buenos-Aires to Chascomús alone, this line dispatched 216,933 passengers and 52,216 tons of goods during the year 1870, which produced $ 656,000 gold; working expenses amounted to $ 336,566—or 51. 34 %—and left net $ 319,435 gold. The next year these figures rose most astonishingly:—

	Passengers.	Tons.	Gross-receipts.	Working-expenses.	Net-earnings.
1872....	311,246	86,903	891,834	482,346	409,488
1873....	424,705	98,238	1,044,487	537,487	470,829
1874....	524,214	103,822	1,126,187	636,719	489,462

The Province of Buenos-Aires granted the concession for the construction of a railway from the city to the Tigre, a small village on the banks of the stream of that name. This line, called the *Northern-Railway of Buenos-Aires*, carries a great part of the passengers for the ports of the river Paraná; to escape the dangers and discomforts of embarkation in the roads of the city, the majority take the steamer at the Tigre, which connects with the river Paraná, and therefore, use the rail to the port of embarkation.

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* This considerable increase of passengers was caused by the epidemic of yellow-fever in the city of Buenos-Aires, which obliged the inhabitants to flee to the surrounding country.

This line was opened to traffic in 1865; its cost is $ 1,506,000 gold, on which the government grants a subsidy of 7 %.

The operations of this line have been as follows:—

	Passengers	Tons.	Gross-receipts.	Working-expenses.	Net-earnings.
1870....	407,703	18,152	251,826 gold	156,138 gold	956,88 gold
1871....	631,611	14,387	366,577 „	173,085 „	193,492 „
1872....	542,209	15,429	316,630 „	181,069 „	135,561 „
1873....	691,656	35,930	334,918 „	187,906 „	147,012 „
1874....	495,505*	43,541	332,786 „	188,939 „	143,847 „

The *Buenos-Aires and Ensenada Railway* was opened to traffic in 1872 throughout its entire length, after having for several years run only to the Boca and Barracas, some 3 miles beyond the city. Including the wharf and port-works at Ensenada, the capital of this enterprize is $ 3,430,000 gold. Heavy-draft vessels can lay alongside the wharf, at the terminal-station of Ensenada, where they can discharge directly into the railway-wagons. The central-station of Buenos-Aires is also alongside of the principal Custom-House building, and the question whether it is possible to create a port in Buenos-Aires unless at enormous expense, being as yet without a satisfactory solution, there is a possibility—not to say probability—that Ensenada will become the real port of the country.

The official reports of this line show the following business:—

	Passengers.	Tons.	Gross-receipts.	Working-expenses.	Net-earnings
1873....	647,957	99,401	1.305,609	716,072	589,537
1874....	681,867	115,183	1,407,734	795,892	611,842

It is to be remarked that this line connects beyond the city, with the Southern, and transports many of its passengers to the junction.

The construction of the *Argentine-Central* commenced in 1863, and was opened throughout in 1870. The Government granted a guarantee of 7 % upon the capital, which was fixed at £ 6,400 per English mile.

The following is the report for the three first years:—

	Passengers.	Tons.	Gross-receipts.	Working-expenses.	Net-earnings.
1871....	48,853	32,281	732,018	366,009	366,009
1872....	67,644	56,781	775,563	339,492	442,071
1873....	68,581	59,873	812,165	364.435	447,130

The returns for 1874 are still wanting.

The *Eastern-Argentine Railway*—Concordia and Monte-Caseros—was not opened throughout, until 1875. The English company which constructed and manages it, also holds a guarantee of 7 % upon its capital which is about $ 4,704,000 gold.

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* This decrease of passengers in 1874, is explained by the opening of a tramway to Belgrano.

The *Andine-Railway* was built for account of the National Government, and opened to Villa-Mercedes—Province of San Luis—in October 1875.

The *Railway* from *Buenos-Aires to Campana*, is already in operation. The Federal Government has granted a guarantee to it, upon a cost of $ 41,670 gold, per English mile.

The three first sections of the *Northern-Central*—Córdoba to Tucumán—are in operation. The line is constructed for account of the Argentine Government at an expense of $ 26,116 gold, per English mile. The guage is as above indicated, which is the reason why the expense is small, not exceeding in all $ 8,500,000 gold.

The construction of the second section of the *Eastern-Argentine*—from Monte-Caseros to Mercedes, Corrientes—has been already granted, and on the part of the National Government 7 % has been guarantied on a capital of £ 10,000 per mile, *i.e.*, $ 4,555,000 gold for the whole. The concession for its extension to the city of Corrientes, has also been granted with a capital of $ 6,188,000 gold, or $ 44,845 per mile.

The concession for the *Interoceanic-Trasandine Railway* is doubtless, the most important as yet voted by Congress; it was finally adjudicated to Messrs. Clark & Co. Its construction has been divided into two sections; the first will start from Buenos-Aires, cross the pampa to Villa-Mercedes in San Luis, and thence to the city of the same name, and to La Paz, Mendoza, and probably San Juan. Its extent will be 724 English miles, and the cost, some $ 21,000,000 gold.

The second-section will leave the city of San Juan and proceed by the pass of *Los Patos*, or from Mendoza by that of Uspallata, to the Chilean frontier, to which point Chile will extend her system of rails, so that a line will be opened from Buenos-Aires to Valparaiso. The cost of this section of 150 miles long, is estimated at 8 ½ millions, and the Argentine Republic has given a guarantee of 7 % upon the total cost of construction.

Moreover, the Argentine Congress has granted the necessary funds:—

1st; For the construction of a railway starting from *Tortoralejas*—on the Córdoba and Tucumán line—to San Juan, and by the city of Rioja with a branch to the city of Catamarca; the cost is taken at $ 28,962 gold per mile, which makes a total of $ 12,743,280 gold.

2d; The railway from *Tucumàn to Jujuí*, with a branch to the city of Salta; expense $ 44,845 per mile, total $ 9,865,000 gold. The guage of these two, as well as that of the Interoceanic-Transsandine, will be of 1 metre.

We would extend these remarks too much were we to mention

in the same manner, all the other lines granted or projected. The details given, notwithstanding their brevity, are sufficient to prove the wide field which is open to speculation in this branch. Up to the present, it has been English capital which has almost exclusively become interested in these enterprises: but it is to be hoped that finally the capitalists of the European continent, will also become acquainted with the advantages which the Argentines offer in this, as well as in many other respects; already French capitalists have made a petition respecting the construction of a railway from the city of Santa-Fé, to some agricultural establishments in the neighborhood.

During the administration of Sr. Sarmiento, the system of Argentine telegraphs stretched its wires over the whole Republic. It already comprises 7613. 69 kilometres in operation, and 3276.52 kiloms. in construction and projected. Like the railways, the telegraph also plays an important part in the development of the Republic, and it would be difficult to estimate the beneficial results already derived from it.

Several weeks were formerly required to send news from the Provinces to the Federal seat of Government; an inconvenience which was frequently exploited by political partizans to the prejudice of the country. Let us suppose that a *caudillo—ang.* military chieftain—wished to make a *pronunciamiento*, no matter how little he might be upheld by the people, he could count—if not always upon success—at least upon impunity, because the Government of the Province interested, was not always in a condition to snppress the insurrection, or to punish the insurgents in case of their defeat: nor could the neighboring Provinces without an order from the Central Government send any armed assistance to the Provincial Government in difficulty, so that each Provincial Government was reduced to its own resources, until the President, making use of the power conferred upon him within certain limits, could sustain the legitimate authorities of the Province by his intervention. But formerly, before this were possible or that the necessary orders could arrive at the locality in danger, six or eight weeks sometimes passed away, during which the rebellion could not only take the upper-hand, but also, by the consent of a new Provincial Legislature the change could be so fortified, that sometimes the Central Government would find itself in the presence of a fixed fact worthy of respect. It is proper to add that such *pronunciamientos* were rarely made against the National Government, to which, on the contrary, the *caudillos* never failed to express their devotion in the pompous language usual to them, and to speak of the purely local character of the insurrection; it is true

that these "revolutions"—as they are called here—were always based on personal ambition. Often enough the insurgents pretended to operate in combination with the Government; in other words, they based all their plans upon the distance which separated them from the Central-power.

The telegraph has repressed these disorders formerly so frequent, in such wise that they may be considered as done away with forever, because their partizans well know, that before they have half prepared their inevitable "proclamation to the people," the telegraph will order the nearest detachment of the army of the line, to prepare to march, whilst it also informs the most influential persons in the insurgent locality, of the intentions of the Government. Under such conditions a *pronunciamiento* dies a natural death, and thus, having ceased to be a pleasure devoid of danger, the Provincial "revolutions" formerly so frequent, have come to an end, to the great good of the Republic and its reputation abroad. Not understanding the condition of this country, foreigners have been too ready to attach greater importance to these perturbations than they really deserved; they placed them in respect to their influence upon life in general, on the same footing as European revolutions, whilst a Provincial insurrection here, was of but little more importance to us, than a change of Ministry in the older States.

The National telegraphs no matter the distance, charge only one price for telegrams. A simple message consists of ten words and costs including the addresses, only 25 cents in gold.

The entire number of telegrams dispatched was; in

1870.....	6,640
1871.....	61,429
1872.....	181,723
1873.....	170,823
1874.....	262,376

Not only is the Interior crossed by telegraph-lines, but we have also direct telegraph-relations with the rest of the world. The first foreign-telegraph was laid by an English-company between the cities of Buenos-Aires and Monte-Video, which are so closely united in commercial interests; it is a submarine, or rather a subfluvial-line. This enterprise which produces excellent results, was soon followed by others whose wires cross the Cordilleras covered with snow, and place Buenos-Aires in connection with Valparaiso, and thence with the other principal ports of the Pacific. Thereafter, the Transatlantic-telegraph was laid, and we are now in daily communication with the Old-World.

The annexed map gives the details of the positions of the different lines.

Much money has been spent in the construction of roads in the Interior of the Republic, a branch of progress which as yet is almost exclusively in charge of the Federal Government, which has also done much by means of subsidies, to maintain the regular mail communications with the towns situated beyond, and aside from, the railways; during the year 1874, it spent for this purpose more than $ 140,000 in gold.

The regulation of the postal-service, in a country where the centers of population are separated by such great distances from each other, is a sufficiently complicated problem that above all, demands time and perseverance for its solution. The postal-tariff is 5 cents for a single letter of 8 grammes weight; the official correspondence is free, as well as that of military persons in active service, but inasmuch as we have no postal conventions in operation, except with the neighboring Republics of Uruguay, Paraguay, Bolivia, Chile and Perú, the letters addressed from abroad are subject to the local-tariff. It is only lately that transatlantic postal-conventions have been made, first with the United States of North America, then with Spain; negotiations have been opened with Germany, and the General Post-Office Department expects to accede to the Postal-treaty of Berne.

Not long since the English and French Governments, who subsidize their lines of Ocean-steamers to our ports, had their own Post-offices in their respective Consulates in the city of Buenos-Aires, where letters to be forwarded by their steamers, could be franked. They paid no export-postage; whilst the mail-matter which arrived, was sent to the city Post-office which charged import-postage. Since the closure of these Consular Post-offices owing to the demand of our Government, each single letter of 8 grammes weight, pays the same export and import-postage, there being only indirect means of franking a letter to its destination. Periodicals not illustrated, are sent gratis by the Argentine post, both within and beyond its jurisdiction.

At the end of 1874, the General Post-office located in the city of Buenos-Aires, had 298 Post-offices under its direction, of which about 78 were opened during the year. Of this sum total, 101 belong to the Province of Buenos-Aires; to Córdoba 17; Corrientes 31; Catamarca 8; Entre-Rios 18; Jujuí 13; Mendoza 6; Rioja 19; Santa-Fé 31; Salta 21; San Luis 10; Mendoza 5; San Juan 6, and Tucumán 15.

The following table gives a sketch of postal-matters during 1874.

PROVINCES	LETTERS		PRINTED MATTER		OFFICIAL CORRESPONDENCE		RECEIVED	DISPATCHED
	Received	Dispatched	Received	Dispatched	Received	Dispatched	Gold-dollars	Gold-dollars
Buenos-Aires..	1500824	1450353	776163	924991	56429	81728	119354.07	78297.80
Santa-Fé.....	190704	206725	119690	169691	13882	13241	14570.28	15560,33
Entre-Ríos.....	107371	106907	78510	51247	11515	10544	9771.88	11799.16
Córdoba.....	74856	75793	49558	42362	3024	2564	8914.90	10220.20
Corrientes	46674	48152	31615	16555	5511	5164	3346.58	7766.—
Mendoza.....	34447	35686	23501	13770	1787	1859	2525.61	6856.37
Tucumán.....	23061	27072	25943	16368	1570	1280	1489.70	2652.—
San Luis.....	27559	19168	35536	8448	2936	2910	1038.07	2256.—
Salta.....	23533	21838	35849	16863	2204	1749	917.35	6157.—
San Juan.....	20665	20329	25540	9731	1280	1299	1728.42	2412.—
Rioja.....	15113	15141	18864	11402	4604	4751	845.54	2431.48
Catamarca....	14151	14147	15743	8788	1605	2109	1060.36	3459.—
Santiago.....	11014	9840	14939	8962	1179	1323	863.92	1680.—
Jujuí	6097	6277	11685	7839	1525	1571	605.74	4920.—
Total....	2096069	2057428	1263142	1307017	109051	132092	167032.42	156467.34

As we see, about seven millions pieces of postal-matter were received and dispatched, of which two-thirds belonged to the Province of Buenos-Aires; and this Province shows greater imports than exports, although it must be observed that almost all the remittances beyond-sea, pass through the central-office.

Although the increase of postal-matter is considerable, its augmentation may be ascertained by the statistics of the Central-office since 1865. In that year 992,978 pieces of postal-matter were received, and 1,001,564 dispatched. Thus the movement has just doubled in ten years.

It has been already mentioned that the Federal Government is charged with the construction of the principal routes, and that considerable sums are employed for this purpose. To this end, a special fund exists by the emission of bonds, called "roads-and-bridges' bonds." Unfortunately, the immense extent of the country, and the little satisfactory organization of the Bureau of Public-Works, presented so many difficulties for the repair of the roads, that many bridges and routes constructed at great expense, were soon destroyed. Under the new organization of this Bureau which commenced in January 1876, a decisive improvement is expected in this respect.

Our routes of communication with the Pacific States pass over the colossal Cordilleras, and are therefore affected by natural obstacles—such as the snow—, which at certain seasons render entirely impassable the gorges through which the roads pass. Probably there are twenty of these passes which lead from the Ar-

gentine Provinces of the Andes, to the Pacific, the most important of which are those of Uspallata and Los Patos. In the Southern part of these mountains it is said, that such gentle declivities are found that wheeled-vehicles can pass from one side to the other of the mountains; and it is positively known that during the domination of the Spaniards several times caravans of carts came from Chile to the Provinces of Cuyo; and it is not long since, the inhabitants of San Juan welcomed in triumph within their city, a troop of carts from the Chilean provinces of Valdivia.

Inasmuch as the principal commerce at present, consists of cattle, and beasts of burden and the saddle, fatted on the Argentine plains, which pass the gorges we have mentioned, if not without some loss at least without great difficulties; and that on the other hand, it is expected that the railway already commenced will soon be finished; the Argentine Government has limited itself in its care for these communications—politically and commercially so important—to building some little stone-houses on the principal roads, to protect voyagers. But it is evident that this question should be better considered, and that an expedition should be prepared to completely explore all the Cordilleras, and particularly those which have been forgotten. Doubtless it would happen, that by this work relatively of small cost, good roads not only safe but commodious could be made to Chile. A tradition exists worthy of faith, that a pass—the Riñihué—exists across the Cordilleras in 39° 45', which opens a connection between the lakes situated on each side of the mountains, and that the river Valdivia rises in the lake Riñihué, whilst a branch of the river Negro connects with the Eastern lake.

This description of our means of communication cannot be terminated without mention of our tramways or "horse-railroads," which particularly in the city of Buenos-Aires, have been developed in an unexampled manner. In that city six Tramway companies exist, (Oct. 1875) which—except N° 2—give the following results by their reports for the year 1874.

1. The *Argentine-Tramway* ran 340,180 English-miles in 58,810 trips, and carried 1,441,389 passengers.

2. *Belgrano-Tramway*—in the second half-year—had 35 coaches in service and occupied 153 employés with 411 horses. During the same period it carried 792,440 passengers in 41,892 trips.

3. *Boca-and-Barracas Tramway*, carried 1,136,345 persons in 45,903 trips, and ran 243,876 miles.

4. *City-of-Buenos-Aires Tramway*, which is the most important of all, owning some 52 kilometres of track, carried 5,855,536 passengers.

5. The *National-Tramway* made 86,642 trips, and carried 1,475,960 persons,

The price of passage in the city proper, is 8 cents, and beyond it 12, 16, and 20 cents, according to distance. Also in other cities, of the Republic—Rosario for instance—tramways begin to be established: yet it is very sure that the system cannot become so extensive in them, as in the populous and commercial city, the metropolis of the River Plata.

If then the Argentine people can regard with satisfaction the progress made in their means of communication by land, unfortunately, the same cannot be said in reference to the utilization of the rivers with which Nature has gifted the Republic. It is true that the rivers which flow over the Argentine plains—as we have already said in a former chapter—differ from those of many other countries, inasmuch as they have no firm bed and therefore run a very-crooked course, from which results a more-or-less great loss of water that affects the navigation. The configuration of the land is the cause of this, whilst at the same time it renders the remedy of easy application; because, upon the whole earth assuredly there is no soil which presents fewer technical difficulties to artificial canalization, than that of our plains. There is no doubt then, that our vast country will soon display a net-work of canals which will rival in extent, and even surpass in importance that of the railways. Not only will these canals considerably cheapen freight, but rural economy and agriculture will receive a powerful impulse, from the ability to use irrigation on a large scale.

To facilitate communications the country, ought to give its attention to its navigable streams in the first place: a glance at the chart is sufficient to show the sinuosities and endless-turns to which our rivers are subject without exception. Often an excavation of some hundreds of metres long would shorten a bend, perhaps, of as many kilometres, and it is asserted that the length of all our rivers could be reduced one half by proper works. It is to be observed, that by these cuts-off not only would the distance be greatly reduced, but a greater depth would be procured at the same time, and the formation of sand-banks would be entirely done away with, or at least considerably reduced.

Without mentioning the great number of small-rivers which could be made navigable, at least in their lower sections, we will only recall the great importance of the navigation of the Salado and Vermejo rivers. Both are sufficiently large to bear vessels heavily ladened to the Provinces of Santiago and Salta, were it only resolved to destroy their capricious bends. It is said that the country of the Argentines wants water; but in reality lacks it a serious desire to utilize this gift of Heaven, which has not been bestowed upon us with parsimony.

The masses of water which are lost in the salt-lagunes, or in the plains by absorption, would be more than sufficient to maintain canals across the pampas. This is proved by the fact, that in many places in the country, a river or stream on account of having been neglected, carries much less water at present than when it served artificially, to irrigate an extent of land five times greater than that which it actually fertilizes.

This predicament as we said before, is so manifest, that a radical remedy cannot be long delayed, and operations have already commenced, although much indeed has to be done.

Congress has ordered the appointment of a special commission to study the necessary improvements of our rivers, and moreover, several Provinces with the assistance of the Federal-treasury, have commenced their works of canalization. A strongly-subsidized company is at work to remove the obstacles in the Vermejo; its steamers have reached the Province of Salta, but as yet they take too much time for the trip.

The navigability of the Vermejo is proved; that of the Salado cannot be doubted. Lieut. Page, of the U. S. Navy, came here by the order of his Government, in 1853, to explore the River Plata and its confluents; he went up this river a considerable distance in his steamer, and also explored its upper-courses; after-having recognized its importance, he was convinced that the river Salado could be made navigable to the center of the Province of Santiago.

It is the best of all, that these hydraulic-works can be constructed with the greatest facility. No rocks are to be pierced, no hights to be leveled; but the excavation of a sufficiently wide and deep ditch in the soft and stoneless-soil of the pampa, would suffice in almost—if not—all cases; the excavated matter could be utilized on the spot, either to raise the borders or to fill the marshes; in a word, it would be an amusement for a professional man to conduct such works. Therefore, their expense would be small, and so much the less to be considered, because by rendering navigable our rivers and making canals which would cross plains at present uninhabited, they would become prosperous in much less time, than by means of the railways. This would be the case more particularly with the Southern lands, which are divided by five powerful rivers whose abundant waters leave no doubt that they would be navigable for great distances after some excavations have been made, or they be properly dredged.

The powerful Paraná river is navigable for hundreds of leagues even by sea-going vessels, although its navigation is not of the most convenient, particularly for sailing-vessels. The great number of islands renders the route very tortuous, and not only in the hight of the water very variable, but it continually forms

new banks of sand, the old ones disappearing in such wise, that already, after hardly 20 years have passed, the chart made by Lieut. Page is inexact in many places.

Nevertheless, the Paraná is a great water-route, and is constantly traversed by elegant-steamers which at present transport all the passengers, and a great part of the merchandise.

Inasmuch as the navigation of Argentine rivers is free, many foreign-vessels of all flags take part in the coasting-trade; latterly however, the Argentine-flag has decidedly the majority, especially in steamers.

The greatest part of the small-craft engaged in the coasting-trade, bear the Italian colors. The price of passage and freight is generally high; thus the voyage from Buenos-Aires to Rosario —18 hours long—is $ 15 in gold, to Corrientes $ 30; 2d-class is one half; in both cases food is included. Freight by steamer to Rosario is $ 6, to Corrientes $ 15 gold, per ton. In sailing-vessels there is no fixed rate; according to circumstances, it is from 50 to 70 % that of steamers.

Commerce upon the Uruguay is not less lively than on the Paraná, and Buenos-Aires is in daily communication with Montevideo by steam; the same occurs with the Southern settlements of Bahia-Blanca, Patagones and Chubut, on the Southern sea-coast. The price of passage to the two first is $ 32 gold, and to the last $ 45; third-class passage is $ 20 and $ 35 gold.

The communications which Buenos-Aires entertains with Europe, are certainly surprizing. The principal lines are:—

That of *Southampton*, long since established and which sends two steamers per month.

The *Bordeaux line*, also with two steamers per month, besides that of the steam-packets each fortnight for the Pacific ports, which touch at Monte-Video both on the outward and return voyage.

The *Bremen* line, with one steamer per month.

The *city of Hamburgh* sends two steamers per month, and the *Hamburgh-Callao* line, touches once per month, at Monte-Video.

Marseilles, *Havre* and *Antwerp*, each send two steamers per month.

The *Genoa* and *Naples* line, send from 3 to 5 steamers per month.

Also the *Bayonne, Cadix and Buenos-Aires, line*, sends its steamers irregularly; but the principal lines often send an extra-steamer per month, to which may even be added the coast-line from Rio de Janeiro. Thus we have almost a daily steamer, and as they generally touch at the ports of Brazil, we are in constant communication with them. The price of passage for the first-class to Europe, according to the port of debarkation, is from $ 150 to $ 175 gold; the second-class, is one half of the same.

CHAPTER XVIII.

COMMERCE AND GENERAL INDUSTRY.

In the preceding chapters we have mentioned some of the obstacles which, without exactly paralyzing the prosperity of our commerce, some years ago rendered it at least more difficult; and these obstacles as yet exist in part. But notwithstanding, and although the country is so sparsely peopled, its commercial relations have latterly augmented with rapidity, and have already acquired an importance which gives the Argentine Republic a preeminent place among commercial nations. As a satisfactory proof of this assertion we append to this chapter the official documents, whose details enable our readers to study with exactitude, all the branches of our commerce which may interest them.

It is only since 1871, that annual official-statistics of commerce are published; all preceding ones only treated of the movement of the principal Custom-House of Buenos-Aires. But although some essential improvements may be noted in these annual reports, they still require a compendium which would give a clear idea of our foreign commercial relations; this we have attempted to remedy—at least in part—by the annexed supplement.

We have but little to say to explain these tables. It is to be first observed, that in making the Custom-House registers whether of imports or exports, the countries are designated where they have been entered or dispatched; but it happens that these designations are not always correct. Thus, among the merchandise which appears as entered from France and England, there is much which has been sent by other nations *via* the ports of those countries, to our ports; whilst on the other hand, there are several countries which do not procure their Argentine produce directly from us. Zwitzerland, for example, does a considerable import commerce with the Argentine Republic, and yet in our commercial statistics

she does not appear at all. Belgium also, figures in the first place among the purchasers of our produce, but it would be a mistake to believe that she takes such a great quantity for her own consumption: on the contrary, a large portion of it passes to Germany and to the North of the European continent. Then again, a great many loaded-vessels leave our ports, cleared for England, which only touch in the Channel for orders; *i.e.*, to learn their final destination: in this way the owner is able to send his cargo to a market where the prices or other circumstances, may be more favorable to his interests. Nevertheless, this produce appears upon our books as exported to England, whilst in reality it is rarely introduced into that country, but generally figures among the imports of another one. Thus it is easy to understand, that the books of the Argentine Custom-House and those of countries in commercial relations with us, cannot always agree on the head either of exports or imports.

Our tables show quite large importations from Uruguay, but at the same it is remarked, that it almost exclusively consists of foreign articles. This is explained by the fact, that many of the large commercial houses of Buenos-Aires have their branches at Monte-Video, for the purpose, according to their convenience, of supplying both markets. Little as we consume of the Uruguayan products, just so little does this neighboring country consume of our own: but many vessels load in the Uruguay river for beyond-sea, and complete their cargoes with Argentine productions, which is all the easier, because the ports of the Uruguay belonging to the Republic of the same name, are almost always opposite to Argentine ports. Thus the exporting merchants in these latter, find it more advantageous to dispatch their goods on board the foreign vessel on the other side of the river, than to send them to the more distant market of Buenos-Aires, where freight and local expenses are much higher.

Chile also sends goods of European manufacture to the Argentine Republic. The Chilean markets offer to the Provinces of Cuyo —*i.e.* Mendoza and San Juan—as also to Salta, greater advantages for the acquisition of certain articles, than our own ports; although it is requisite to transport them across the Cordilleras on mules, in many cases according to the place of consumption, the transport is cheaper and much more prompt. This state of things will be notably changed on the conclusion of our principal railways; and even now, a diminution of imports from Chile may be remarked, due to the increased facility of communication between our own ports and the interior cities.

We must yet remark in reference to the column of totals in our statistics, that the indicated values are not based upon the real prices of the merchandise imported or exported: on the

contrary, they are calculated on an average of 30 or 35 % lower than their true value. The Custom-House regulations give us a proof of the truth of this remark, by obliging the Collector to pay 10 % above the invoice price of merchandise, when suspecting fraud, he desires to confiscate it.

It is generally considered that credit is favorable in a country where commerce has become of great importance. Among us however, this maxim is only relatively true, for although commerce is strongly developed, credit is somewhat in arears. The circumstance that business to within a short period, was, thus to say, almost exclusively in the hands of foreign-capital, has contributed much to this state of things; and even yet the wholesale and retail trade is principally in the hands of foreigners settled here, whilst the Argentines generally occupy themselves in the acquisition of lands.

The political past of the country in its long war for Independence, and the civil-wars which followed it, caused the poverty of the Argentines, and they found themselves without means when called upon to develope their enormous natural riches. It was necessary therefore, to have recourse to foreign-capital, and the earnestness—especially on the part of England—with which it was offered, yet not to its disadvantage, is cheerfully recognized. Not only were all the State loans negociated in London, but several millions of pounds-sterling have also been introduced for mercantile and industrial purposes, and the construction of railways. In this manner foreign capital, which reacts upon credit, has acquired great influence in the country, because, where the market is more or less governed by foreign capitalists, individual credit useful as it is, cannot be established.

The creation and prompt prosperity of the Provincial Bank of Buenos-Aires under such circumstances, could only produce consequences of the grestest importance; and indeed, this institution of credit—to day the most powerful of all—has broken the preponderance of foreign-capital. It finds its principal exercise in the support and increase of commerce, and it brought labor, until then systematically excluded from the benefits of credit, within the bounds of its operations; it has therefore, so well understood its duties, that the powerful development of the Province of Buenos-Aires, is due in great part to it.

The flourishing condition of this Bank gave rise to the desire of creating an institution which would give the same aid to the whole country, thus carrying out a Constitutional provision which prescribes the foundation of a National Bank. The want of such an institution was the more urgent, inasmuch as credit was not in vogue in the Interior save in rare cases, and then loans could only be procured for short periods—2 or 3 months—and at rates even

above 36 % per annum. Some three years ago, when Congress accepted the propositions which were made to it about this Bank, it gratified the universal popular desire, which was manifested in such a lively manner on the occasion of the subscriptions to its shares, that it was necessary to greatly reduce them in the allotment. Even although the opening of this Bank took place at the commencement of a serious commercial crisis, which, already lasting for years, seemed to prevent the realization of its capital of $ 20,000,000 gold, it fulfilled its obligation of opening branches in all the Provinces, thus remedying, or more or less attenuating, an evil long since felt.

The Hypothecary Bank of Buenos-Aires, and the Provincial Banks of Santa-Fé and Córdoba, were also recently started, and others of the same kind are about to be opened in other Provinces.

Private Banks are not wanting in Buenos-Aires, and in general, efforts are made to facilitate a well-regulated credit to a constantly increasing number of persons, by the establishment of new Banks.

The banking-business is not only very lucrative here, but also entirely secure. The State Banks, which as yet are the only ones that grant personal-credit on a small scale, enjoy fiscal privileges, whilst the customs of the private Banks are of such a nature, as to exclude all risk in their discount business.

It is an exception when interest at the Banks is below 10 % per annum; the average is 12 %; only the Bank of the Province of Buenos-Aires makes advances at moderate rates; viz, 6 % in good, and 8 % in bad-times. The latter rate is prescribed by law to the Hypothecary Bank. The interest allowed on deposits is one-half, and sometimes one-third, of what they demand on loans. In this manner these establishments obtain a net benefit of from 12 to 20 % per annum.

The respective authorities naturally exercise some influence upon the nomination of the Directories of the State Banks. The Provincial and Hypothecary Banks of Buenos-Aires are managed by Directories chosen annually by Government nomination, and the consent of the Senate. With the exception of the Presidents, they receive no remuneration. Two-thirds of the Directory of the National Bank whose members receive a percentage of profits, are named by the general assembly of shareholders, and the remainder by direct nomination of the National Government, which owns a large quantity of shares. The elections in the other State or Provincial Banks are held in the same manner. In all cases however, measures have been taken to protect these institutions from all intervention on the part of the authorities in their management.

The business of Insurance is poorly developed in this country, although some Companies of the kind exist which give good divi-

dends to their shareholders. Some of the most important European companies, particularly in the fire and maritime branches, have agents here; but their operations are not extended, because the shippers of merchandise to foreign ports generally insure in European companies, whilst insurance against fire is only taken in the large cities, principally Buenos-Aires and Rosario, and even there only on a limited scale. The method of house-building almost entirely excludes the use of wood; therefore insurance against fire is not a great necessity, and indeed damages therefrom are quite rare.

Life Insurance is even more neglected, but it is to be hoped that this beneficent institution will soon be utilized according to its merits.

The tables appended to this chapter contain so many details in reference to Argentine commerce, that it appears superfluous to give any explanations on the subject. However, this is the place to sketch the method of treating the products of the *estancias* until the moment of their embarkation. When the cattle are fat, they are bought either on their own account or for the large abattoir, by purchasers who visit the *estancias;* thence they are driven in herds to the market, to be killed for the consumption of the place, or oftener to the large salting-establishments, or *saladeros.* In the first case, the hides are dried in the air stretched on scaffoldings; thereafter, they are carried to the produce-depots called *barracas*, where they are prepared for exportation by passing them through a poisonous solution, to preserve them from moths or worms. The grease and tallow are tried-out in steam-boilers made for the purpose, and then run off into barrels or half-pipes for embarkation.

In the *saladeros*—in each one of which during the season several hundreds of heads of cattle are killed per day—the meat is cut into thin-slabs and piled up in large stacks with salt; afterwards it is dried upon the scaffolds, and then it figures in commerce under the name of *carne tasajo.* The oft-times defective preparation of this meat, prohibits its transport to European markets; on the other hand, it finds an easy sale in Brazil and Cuba, where it serves as nourishment for the slaves.

There is another method of preserving meat by cutting it into strings, not salted, but dried in the sun; this system produces a far more nourishing article than the other, under the name of *charque dulce;* however, it enters but little into commerce.

It results from what we have said, that this country has not yet accomplished its duty, by furnishing to Europe which is poor in meats, this most important of all foods. It is true that many attempts have been made to preserve it in a rational manner; but until now, only the method of the celebrated chemist Liebig, of extracting the most essential substances of the meat, has produced

satisfactory results. Every thing in this problem of how to utilize our superfluous meat, remains to be done, and it is sure that the man who solves it will be recompensed in the most brilliant manner. Hides are also salted, and thus sent to European markets under the name of salt-hides. In addition to the melting of the grease and tallow, even the carcasses are thrown into the great boilers to try out such grease as they may contain, and then the large bones are ground into bone-flour for the English-market.

The mares, which are never used here as draft or saddle-animals, are also sent to the *saladeros* for their grease, which is known in commerce as *animal-oil;* whilst their salted-hides furnish a material much used for carriage-trimmings.

Owing to the great increase of sheep, a number of "grease-founderies" have been established, principally in the country-districts near some railway station or port, which are exclusively dedicated to the slaughter and explotation of sheep. The operations of these establishments are extremely simple. The dead-sheep is stripped of its skin and the whole-carcass thrown into the grease-boiler, to procure the suet and grease. The cooked-carcasses serve afterwards for fuel, which is an improvement on the old method, when it was nothing extraordinary to fire the boilers with whole animals scarcely dead.

The unwashed-wool—principal product of the Argentines—is classified in the *barracas;* then it it is pressed into bales of from 7 to 9 quintals weight; there are no large wool-washing establishments here. The sheep-skins, another very important article of exportation, are also pressed into bales of from 8 to 11 quintals weight, and are almost always sent to France.

In speaking of the manufactures of the country, it is to be acknowledged that this branch of human-industry is as yet in a most primitive condition; indeed, we have no manufactures from raw materials worthy of the name, as the lists of our exports clearly show. Manufactures cannot prosper in a country which has only one inhabitant to every two square-kilometres, where labor is extraordinarily dear and in need of capital, and where a knowledge of the different branches is as yet rare. The industrial activity of its inhabitants is principally contented with the acquisition of the raw-material—doubtless of great value—for the purpose of its exportation *en masse*, a part of which returns later on as manufactured. A large immigration is the only remedy to this abnormal condition, because the great dispersion of our people, is the real obstacle to our progress. Since the 1st of January 1876, the law of import duties, in the desire to strengthen our manufacturing interests, approaches so decidedly the system of the United States, that the object desired will surely be gained, should it be completed by another law which would cause a large immigration.

The foundations upon which our manufactures can be established, were prepared by Nature. Every year we send raw-hides abroad to the value of several millions, whilst at the same time the country is rich in tanning material, so that instead, we should export them in the form of leather and its various manufactures. No country presents such advantages for the manufacture of glue upon a large scale, but we see the raw-material required for it, daily lost in large quantities. Our country is also one of those which raises the largest quantities of wool: yet only latterly, some feeble attempts have been undertaken to make woollen fabrics. We could export enormous quantities of salt, instead of which, our *saladeros* bring their supplies from Spain. A numberless quantity of flowers, fruits, woods and aromatic herbs, await the manufacturers of essential oils, whilst entire districts are covered with trees whose ashes contain a quantity of soda, which could be most advantageously employed in the making of soap. The country abounds also in dye-stuffs of all kinds, and our forests are surcharged with medicinal plants. Yet all these and many other treasures are not exploited, although it is known where to find them, for they are met with at every step; their value, their importance to the future of the country, is fully felt, yet they must be passed by without any consideration, because we are too weak; population is wanting to us. The State is certainly justified in granting protection to nascent manufactures, even as a support is given to the young tree until it can resist the dangers which menace its growth. But protection against strong competition is not sufficient to develop the industry of a country, it is necessary also to furnish it with the means of a prompt prosperity; viz., as in our case, with the laboring classes. By attracting an immigration dedicated to a certain branch of labor, some establishments it is true could be kept in activity; but the general manufacturing interests of the country would not on that account prosperous, because, to enable them to become powerfully developed, it is necessary that they spring from the people themselves. No people can maintain a manufacturing class except by the concentration of population. Under this head therefore, the prosperity of our country depends upon a large immigration, composed of solid elements.

We have already spoken in several places about our mines, and proved their capacity, could they be properly worked by a sufficient number of intelligent miners.

But what is wanting to our progress, is immigration; always more immigration.

CHAPTER XIX.

THE CONSTITUTION OF THE ARGENTINE REPUBLIC.

Translated from the official edition of 1868.

PART FIRST.

Declaration of rights and guarantees.

ARTICLE 1. The Argentine Nation adopts the federal-republican, and representative form of Government, as established by the present Constitution.

Art. 2. The Federal Government shall maintain the Apostolic Roman Catholic Faith.

Art. 3. The authorities of the Federal Government shall reside in the city which a special law of Congress may declare the capital of the Republic, subsequently to the cession by one or more of the Provincial Legislatures, of the territory about to be federalized.

Art. 4. The Federal Government shall administer the expenses of the Nation out of the revenue in the National Treasury, derived from import and export duties; from the sale and lease of the public lands; from postage; and from such other taxes as the General Congress may equitably and proportionably lay upon the people; as also, from such loans and credits as may be decreed by it in times of national necessity, or for enterprises of national utility.

Art. 5. Each Province shall make a Constitution for itself, according to the republican representative system, and the principles, declarations and guarantees of this Constitution; and which shall provide for (secure) Municipal Government, primary education and the administration of justice. Under these conditions the Federal

Government shall garantee to each Province the exercise and enjoyment of its institutions.

Art. 6. The Federal Government shall intervene in the Provinces to guarantee the republican form of Government, or to repel foreign invasion, and also, on application of their constituted authorities, should they have been deposed by sedition or by invasion from another Province, for the purpose of sustaining or re-establishing them.

Art. 7. Full faith shall be given in each Province to the public acts, and judicial proceedings of every other Province; and Congress may by general laws, prescribe the manner in which such acts and proceedings shall be proved, and the effect thereof.

Art. 8. The citizens of each Province shall be entitled to all the rights, privileges and immunities, inherent to the citizens of all the several Provinces. The reciprocal extradition of criminals between all the Provinces, is obligatory.

Art. 9. Throughout the territory of the Nation, no other than the National Custom-Houses shall be allowed, and they shall be regulated by the tariffs sanctioned by Congress.

Art. 10. The circulation of all goods produced or manufactured in the Republic, is free within its borders, as also, that of all species of merchandise which may be dispatched by the Custom-Houses of entry.

Art. 14. Such articles of native or foreign production, as well as cattle of every kind, which pass from one Province to another, shall be free from all transit-duties, and also the vehicles, vessels or animals, which transport them; and no tax, let it be what it may, can be henceforward imposed upon them on account of such transit.

Art. 12. Vessels bound from one Province to another, shall not be compelled to enter, anchor, or pay transit-duties; nor in any case can preferences be granted to one port over another, by any commercial laws or regulations.

Art. 13. New Provinces may be admitted into the Nation; but no Province shall be erected within the territory of any other Province, or Provinces, nor any Province be formed by the junction of various Provinces, without the consent of the legislatures of the Provinces concerned, as well as of Congress.

Art. 14. All the inhabitants of the Nation shall enjoy the following rights, according to the laws which regulate their exercise; viz., to labor and to practice all lawful industry: to trade and navigate; to petition the authorities; to enter, remain in, travel over and leave, Argentine territory; to publish their ideas in the public-press without previous censure; to enjoy and dispose of their property; to associate for useful purposes; to profess freely their religion; to teach and to learn.

Art. 15. In the Argentine Nation there are no slaves; the few which now exist shall be free from the date of the adoption of this Constitution, and a special law shall regulate the indemnity acknowledged as due by this declaration. All contracts for the purchase and sale of persons is a crime, for which those who make them, as well as the notary or functionary which authorizes them, shall be responsable, and the slaves who in any manner whatever may be introduced, shall be free from the sole fact that they tread the territory of the Republic.

Art. 16. The Argentine Nation does not admit the prerogatives of blood nor of birth; in it, there are no personal privileges or titles of nobility. All its inhabitants are equal in presence of the law, and admissible to office without other condition than that of fitness. Equality is the basis of taxation as well as of public-posts.

Art. 17. Property is inviolable. and no inhabitant of the Nation can be deprived of it, save by virtue of a sentence based on law. The expropriation for public utility, must be authorized by law and previously indemnified. Congress alone shall impose the contributions mentioned in art. 4. No personal service shall be exacted save by virtue of law, or of a sentence founded on law. Every author or inventor, is the exclusive proprietor of his work, invention or discovery, for the term which the law accords to him. The confiscation of property is henceforward and forever, stricken from the Argentine penal-code. No armed body can make requisitions, nor exact assistance of any kind.

Art. 18. No inhabitant of the Nation shall suffer punishment without a previous judgement founded on a law passed previously to the cause of judgment, nor be judged by special commissions, or withdrawn from the Judges designated by law before the opening of the cause. No one shall be obliged to testify against himself; nor be arrested, save by virtue of a written order from a competent authority. The defense at law both of the person and his rights, is inviolable. The domicil, private papers and epistolary correspondence, are inviolable; and a law shall determine in what cases, and under what imputations, a search-warrant can proceed against and occupy them. Capital punishment for political causes, as well as every species of torture and whippings, are abolished for ever. The prisons of the Nation shall be healthy and clean, for the security, and not for the punishment, of the criminals detained in them, and every measure which under pretext of precaution may mortify them more than such security requires, shall render responsible the Judge who authorizes it.

Art. 19. Those private actions of men that in no wise offend public order and morality, or injure a third party, belong alone to God, and are beyond the authority of the magistrates. No

inhabitant of the Nation shall be compelled to do what the law does not ordain, nor be deprived of anything which it does not prohibit.

Art. 20. Within the territory of the Nation, foreigners shall enjoy all the civil rights of citizens; they can exercise their industries, commerce or professions, in accordance with the laws; own, buy and sell, real-estate; navigate the rivers and coasts; freely profess their religion, and testate and marry. They shall not be obliged to become citizens, nor to pay forced contributions. Two years previous residence in the Nation shall be required for naturalization, but the authorities can shorten this term in favour of him who so desires it, under the allegation and proof of services rendered to the Republic.

Art. 21. Every Argentine citizen is obliged to arm himself in defense of his country and of this Constitution, according to the laws which Congress shall ordain for the purpose, and the decrees of the National Executive. For the period of ten years from the day on which they may have obtained their citizenship, this service shall be voluntary on the part of the naturalized.

Art. 22. The people shall not deliberate nor govern save by means of their Representatives and Authorities, created by this Constitution. Every armed force or meeting of persons which shall arrogate to itself the rights of the people, and petition in their name, is guilty of sedition.

Art. 23. In the event of internal commotion or foreign attack which might place in jeopardy the practice of this Constitution, and the free action of the Authorities created by it, the Province or territory where such disturbance exists shall be declared in a state of siege, all constitutional guarantees being meantime suspended there. But during such suspension the President of the Republic cannot condemn nor apply any punishment *per se*. In respect to persons, his power shall be limited to arresting and removing them from one place to another in the Nation, should they not prefer to leave Argentine territory.

Art. 24. Congress shall establish the reform of existing laws in all branches, as also the trial by Jury.

Art. 25. The Federal Government shall foment European immigration; and it cannot restrict, limit, nor lay any impost upon, the entry upon Argentine territory, of such foreigners as come for the purpose of cultivating the soil, improving manufactures, and introducing and teaching the arts and sciences.

Art. 26. The navigation of the interior rivers of the Nation is free to all flags, subject only to such regulations as the National Authority may dictate.

Art. 27. The Federal Government is obliged to strenghten the bonds of peace and commerce with foreign powers, by means of

treaties which shall be in conformity with the principles of public law laid down in this Constitution.

Art. 28. The principles, rights and guarantees laid down in the foregoing articles, cannot be altered by any laws intended to regulate their practice.

Art. 29. Congress cannot grant to the Executive, nor the provincial legislatures to the Governor of Provinces, any "extraordinary faculties," nor the "sum of the public power," nor "renunciations or supremacies" by which the lives, honor or fortune of the Argentines shall be at the mercy of any Government or person whatever. Acts of this nature shall be irremediably null and void, and shall subject those who frame, vote, or sign them, to the pains and penalties incurred by those who are infamous traitors to their country.

Art. 30. This Constitution can be reformed in whole or in part. The necessity for the reform shall be declared by Congress by at least a two-thirds vote; but it can only be accomplished by a convention called *ad hoc*.

Art. 31. This Constitution, and the laws of the Nation which shall be made in pursuance thereof, and all treaties made or which shall be made with Foreign Powers, shall be the supreme law of the land; and the authorities of every Province shall be bound thereby anything in the Constitution or laws of any Province to the contrary notwithstanding, excepting in the case of Buenos-Aires, in the treaties ratified after the compact of Nov. 11th, 1859.

Art. 32. The Federal Congress shall not dictate laws restricting the liberty of the press, nor establish any federal jurisdiction over it.

Art. 33. The enumeration in this Constitution of certain rights and guarantees, shall not be construed to deny or disparage other rights and guarantees, not enumerated; but which spring from the principle of popular sovereignty, and the republican form of Government.

Art. 34. The Judges of the Federal courts shall not be Judges of Provincial tribunals at the same time; nor shall the federal service civil as well as military, constitute a domicil in the Province where it may be exercised, if it be not habitually that of the employé; it being understood by this, that all Provincial public-service is optional in the Province where such employé may casually reside.

Art. 35. The names which have been successively adopted for the Nation, since the year 1810 up to the present time; viz., the United Provinces of the Rio de la Plata, Argentine Republic and Argentine Confederation, shall henceforward serve without distinction, officially to designate the Government and territory of the Provinces, whilst the words Argentine Nation shall be employed in the making and sanction of the laws.

SECOND PART.

NATIONAL AUTHORITIES.

TITLE I.

Federal Government.

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SECTION I.

Of the Legislature.

Article 36. All legislative powers herein granted shall be voted in a Congress composed of two Chambers, one of National Deputies, and the other of Senators of the Provinces and of the capital.

CHAPTER I.

Of the House of Representatives.

Article 37. The Chamber of Deputies shall be composed of representatives elected directly by the people of the Provinces, for which purpose each one shall be considered as a single electoral district, and by a simple plurality of votes in the ratio of one for each 20,000 inhabitants, or for a fraction not less than 10,000.

Art. 38. The deputies for the first Legislature shall be nominated in the following proportion: for the Province of Buenos-Aires, twelve; for that of Córdoba, six; for Catamarca, three; Corrientes, four; Entre-Rios, two; Jujui, two; Mendoza, three; Rioja, two; Salta, three; Santiago, four; San Juan, two; Santa-Fé, two; San Luis, two; and for that of Tucumán, three.

Art. 39. For the second Legislature a general census shall be taken, and the number of Deputies be regulated by it; thereafter, this census shall be decennial.

Art. 40. No person shall be a Deputy who shall not have attained the age of twenty-five years, have been four years in the exercise of citizenship, and be a native of the Province which elects him, or a resident of it for the two years immediately preceding.

Art. 41. For the first election, the Provincial Legislatures shall regulate the method for a direct election of the National Deputies. Congress shall pass a general law for the future.

Art. 42. The Deputies shall hold their place for four years, and are re-eligible; but the House shall be renewed each biennial, by halves; for which purpose those elected to the first Legislature, as soon as the session opens, shall decide by lot who shall leave at the end of the first period.

Art. 43. In case of vacancy, the Government of the Province or of the capital, shall call an election for a new member.

Art. 44. The origination of the tax-laws and those for the recruting of troops, belongs exclusively to the House of Deputies.

Art. 45. It has the sole right of impeaching before the Senate, the President, vice-President, their Ministers, and the members of the Supreme Court and other inferior Tribunals of the Nation, in suits which may be undertaken against them for the improper discharge of, or deficiency in, the exercise of their functions; or for commons crimes, after having heard them, and declared by a vote of two thirds of the members present, that there is cause for proceeding against them.

Chapter II.

Of the Senate.

Art. 46. The Senate shall be composed of two Senators from each Province, chosen by the Legislatures thereof by plurality of vote, and two from the capital elected in the form prescribed for the election of the President of the Nation. Each Senator shall have one vote.

Art. 47. No person shall be a Senator who shall not have attained the age of thirty years, been six years a citizen of the Nation, enjoy an annual rent or income of two thousand hard-dollars, and be a native of the Province which elects him, or a resident of the same for the two years immediately preceeding.

Art. 48. The Senators shall enjoy their trust for nine years, and are indefinitively re-eligible; but the Senate shall be renewed by thirds each three years, and shall decide by lot, as soon as they be all reunited, who shall leave at the end of the first and second triennial periods.

Art. 49. The Vice-President of the Nation shall be President of the Senate; but shall have no vote, except in a case of a tie.

Art. 50. The Senate shall choose a President *pro-tempore* who shall preside during the absence of the Vice-President, or when he shall exercise the office of President of the Nation.

Art. 51. The Senate shall have sole power to try all impeachments presented by the House of Deputies. When sitting for that purpose they shall be under oath. When the President of the Nation is tried, the Chief Justice shall preside. No person shall be convicted without the concurrence of two-thirds of the members present.

Art. 52. Judgement in case of impeachment, shall not extend farther than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the Nation. But the party convicted shall, nevertheless, be liable to indictment, trial, judgement, and punishment according to law, before the ordinary tribunals.

Art. 53. It belongs moreover, to the Senate, to authorize the President to declare martial law in one or more points of the Republic, in case of foreign aggression.

Art. 54. When any seat of a Senator be vacant by death, resignation or other reason, the Government to which the vacancy belongs, shall immediately proceed to the election of a new member.

Chapter III.

Powers common to both Houses.

Article 55. Both Chambers shall meet in ordinary session, every year from the 1st May until the 30th September. They can be extraordinarily convoked, or their session be prolonged by the President of the Nation.

Art. 56. Each House shall be the judge of the elections, returns, and qualificatio s of its own members. Neither of them shall enter into session without an absolute majority of its members; but a smaller number may compel absent members to attend the sessions, in such terms and under such penalties as each House may establish.

Art. 57. Both Houses shall begin and close their sessions simultaneously. Neither of them whilst in sessions can suspend its meetings for more than three days, without the consent of the other.

Art. 58. Each House may make its rules of proceeding, and with the concurrence of two-thirds punish its members for disorderly behavior in the exercise of their functions, or remove, and even expel them from the House, for physical or moral incapacity occurring after their incorporation; but a majority of one above one half of the members present, shall suffice to decide questions of voluntary resignation.

Art. 59. In the act of their incorporation the Senators and Deputies shall take an oath to properly fulfil their charge, and to act in all things in conformity to the prescriptions of this Constitution.

Art. 60. No member of Congress can be indicted, judicially interrogated, or molested for any opinion or discourse which he may have uttered in fulfilment of his Legislative duties.

Art. 61. No Senator or Deputy, during the term for which he may have been elected, shall be arrested, except when taken *in flagrante* commission of some crime which merits capital punishment or other degrading sentence; an account thereof shall be rendered to the Chamber he belongs to, with a verbal process of the facts.

Art. 62. When a complaint in writing be made before the ordinary courts against any Senator or Deputy, each Chamber can

by a two-thirds vote, suspend the accused in his functions and place him at the disposition of the competent judge for trial.

Art. 63. Each of the Chambers can cause the Ministers of the Executive to come to their Hall, to give such explanations or information as may be considered convenient,

Art. 64. No member of Congress can receive any post or commission from the Executive, without the previous consent of his respective Chamber, excepting such as are in the line of promotion.

Art. 65. The regular ecclesiastics cannot be members of Congress, nor can the Governors of Provinces represent the Province which they govern.

Art. 66. The Senators and Deputies shall be remunerated for their services, by a compensation to be ascertained by law.

Chapter IV.

Attributions of Congress.

Article 67. The Congress shall have power:—

1. To legislate upon the Custom-Houses and establish import-duties; which, as well as all appraisments for their collection, shall be uniform throughout the Nation, it being clearly understood that these, as well as all other national contributions, can be paid in any money at the just value which may be current in the respective Provinces. Also, to establish export duties.
2. To lay direct taxes for determinate periods, whenever the common defense and general welfare require it, which shall be uniform throughout the territory of the Nation.
3. To borrow money on the credit of the Nation.
4. To determine the use and sale of the National lands.
5. To establish and regulate a National Bank in the capital, with branches in the Provinces, and with power to emit bills.
6. To regulate the payment of the home and foreign debts of the Nation.
7. To annually determine the estimates of the National Administration, and approve or reject the accounts of expenses.
8. To grant subsidies from the National Treasury to those Provinces, whose revenues according to their budgets, do not suffice to cover their ordinary expenses.
9. To regulate the free navigation of the interior rivers, open such ports as may be considered necessary, create and suppress Custom-houses, but without suppressing those which existed in each Province at the time of its incorporation.

10. To coin money, regulate the value thereof and of foreign coin, and adopt a uniform system of weights and measures for the whole Nation.
11. To decree civil, commercial, penal and mining Codes, but such Codes shall have no power to change local jurisdiction; their application shall belong to the Federal or Provincial courts, in accordance with such things or persons as may come under their respective jurisdiction; especially, general laws embracing the whole Nation, shall be passed upon naturalization and citizenship, subject to the principle of native citizenship; also upon bankruptcy, the counterfeiting of current-money and public State documents; and such laws as may be required for the establishment of trial by Jury.
12. To regulate commerce by land and sea with foreign nations, and between the Provinces.
13. To establish and regulate the general post-offices and post-roads of the Nation.
14. To finally settle the National boundaries, fix those of the Provinces, create new Provinces, and determine by a special legislation, the organization and governments, which such National territories as are beyond the limits assigned to the Province, should have.
15. To provide for the security of the frontiers; preserve peaceful relations with the Indians, and promote their conversion to Catolicism.
16. To provide all things conducive to the prosperity of the country, to the advancement and happiness of the Provinces, and to the increase of enlightment, decreeing plans for general and university instruction, promoting industry, immigration, the construction of railways, and navigable canals, the peopling of the National lands, the introduction and establishment of new industries, the importation of foreign capital and the exploration of the interior rivers, by protection laws to these ends, and by temporary concessions and stimulating recompenses.
17. To constitute tribunals inferior to the Supreme Court, create and suppress public offices, fix their attributes, grant pensions, decree honors and general amnesties.
18. To accept or reject the resignation of the President or Vice-President of the Republic, and declare new elections: to make the scrutiny and rectification of the same.
19. To ratify or reject the treaties made with other Nations and the Concordats with the Apostolic See, and regulate the patronage of advowsons throughout the Nation.
20. To admit religious orders within the Nation, other than those already existing.

21. To authorize the Executive to declare war and make peace.
22. To grant letters of marque and reprisal, and to make rules concerning prizes.
23. To fix the land and sea forces in time of peace and war: and to make rules and regulations for the government of said forces.
24. To provide for calling forth the militia of all, or a part of, the Provinces, to execute the laws of the Nation, suppress insurrections or repel invasions. To provide for organizing, arming, and disciplining said militia, and for governing such part of them as may be employed in the service of the Nation, reserving to the Provinces respectively, the appointment of the corresponding chiefs and officers, and the authority of training the militia according to the discipline prescribed by Congress.
25. To permit the introduction of foreign troops within the territory of the Nation, and the going beyond it of the National forces.
26. To declare martial law in any or various points of the Nation in case of domestic commotion, and ratify or suspend the declaration of martial law made by the executive during the recess.
27. To exercise exclusive legislation over the territory of the National capital, and over such other places acquired by purchase or cession in any of the Provinces, for the purpose of establishing forts, arsenals, warehouses, or other needful national buildings.
28. To make all laws and regulations which shall be necessary for carrying into execution the foreigoing powers, and all others vested by the present Constitution in the Government of the Argentine Nation.

Chapter V.

Of the formation and sanction of the laws.

Article 68. Laws may originate in either of the Houses of Congress, by bills presented by their members or by the Executive, excepting those relative to the objects treated of in Art. 44.

Art. 69. A bill being approved by the House wherein it originated, shall pass for discussion to the other House. Being approved by both, it shall pass to the Executive of the Nation for his examination; and should it receive his approbation he shall publish it as law.

Art. 70. Every bill not returned within ten working-days by the Executive, shall be taken as approved by him.

Art. 71. No bill entirely rejected by one House, can be presented again during that year. But should it be only amplified or corrected by the revising House, it shall return to that wherein it originated; and if there the addition or corrections be approved by an absolute majority, it shall pass to the Executive. If the addition or corrections be rejected, it shall return to the revising House, and if here they be again sanctioned by a majority of two-thirds of its members, it shall pass to the other House, and it shall not be understood that the said additions and corrections are rejected, unless two-thirds of the members, present should so vote.

Art. 72. A bill being rejected in whole or in part by the Executive, he shall return it with his objections to the House in which it originated; here it shall be debated again; and if it be confirmed by a majority of two-thirds, it shall pass again to the revising House. If both Houses should pass it by the same majority, it becomes a law, and shall be sent to the Executive for promulgation. In such case the votes of both Houses shall be by yeas and nays, and the names of the persons so voting shall be recorded, as well as the objections of the Executive, and shall be immediately published in the daily-press. If the Houses differ upon the objections, the bill cannot be renewed during that year.

Art. 73. The following formula shall be used in the passage of the laws: "The Senate and Chamber of Deputies of the Argentine Nation in Congress assembled, etc. decree, or sanction, with the force of law."

SECTION 2d.

Of the Executive Power.

CHAPTER I.

Its nature and duration.

Article 74. The Executive power of the Nation shall be exercised by a citizen, with the title of "President of the Argentine Nation."

Art. 75. In case of the sickness, absence from the capital, death, resignation or dismissal of the President, the Executive power shall be exercised by the Vice-President of the Nation. In case of the removal, death, resignation, or inability of the President and Vice-President of the Nation, Congress will determine which public functionary shall then fill the Presidency, until the disability be removed or a new President be elected.

Art. 76. No person except a natural-born citizen or a son of a natural born-citizen brought forth abroad, shall be eligible as President or Vice-President of the Nation; he is required to belong to the Apostolic-Roman-Catholic communion, and possess the other qualifications required to be elected Senator.

Art. 77. The President and Vice-President shall hold office during the term of six years: and cannot be re-elected except after an interval of an equal period.

Art. 78. The President of the Nation shall cease in his functions the very day on which his period of six years expires, and no event whatever which may have interrupted it, can be a motive for completing it at a later time.

Art. 79. The President and Vice-President shall receive a compensation from the National Treasury, which cannot be altered during the period for which they shall have been elected. During the same period they cannot exercise any other office nor receive any other emolument from the Nation, or any of its Provinces.

Art. 80. The President and Vice-President before entering upon the execution of their offices, shall take the following oath administered by the President of the Senate (the first time by the President of the Constituent Congress) in Congress assembled: "I—*such an one*—swear by God our Lord, and by these Holy Evangelists, that I will faithfully and patriotically execute the office of President (or Vice-President) of the Nation, and observe and cause to be faithfully observed, the Constitution of the Argentine Nation. If I should not do so, let God and the Nation indict me."

Chapter II.

Of the form and times of election of the President and Vice-President of the Nation.

Article 81. The election of the President and Vice-President of the Nation, shall be made in the following manner:—

The capital and each of the Provinces shall by direct vote nominate a board of electors, double the number of Deputies and Senators which they send to Congress, with the same qualifications and under the same forms as those prescribed for the election of Deputies.

Deputies or Senators, or officers in the pay of the Federal Government cannot be electors.

The electors being met in the National-capital and in that of their respective Provinces, four months prior to the conclusion of the term of the out-going President, they shall proceed by signed ballots, to elect a President, and Vice-President, one of which

shall state the person as President, and the other the person as Vice-President, for whom they vote.

Two lists shall be made of all the individuals elected as President, and other two also, of those elected as Vice-President, with the number of votes which each may have received. These lists shall be signed by the electors, and shall be remitted closed and sealed, two of them (one of each kind) to the President of the Provincial Legislatnre, and to the President of the Municipality in the capital, among whose records they shall remain deposited and closed; the other two shall be sent to the President of the Senate (the first time to the President of the Constituent Congress).

Art. 82. The President of the Senate (the first time that of the Constituent Congress) all the lists being received, shall open them in the presence of both Houses. Four members of Congress taken by lot and associated to the Secretaries, shall immediately proceed to count the votes, and to announce the number which may result in favor of each candidate for the Presidency and Vice-Presidency of the Nation. Those who have received an absolute majority of all the votes in both cases, shall be immediately proclaimed President and Vice-President.

Art. 83. In case there be no absolute majority, on account of a division of the votes, Congress shall elect one of the two persons who shall have received the highest number of votes. If the first majority should have fallen to a single person, and the second to two or more, Congress shall elect among all the persons who may have obtained the first and second majorities.

Art. 84. This election shall be made by absolute plurality of votes, and voting by name. If, on counting the first vote, no absolute majority shall have been obtained, a second trial shall be made, limiting the voting to the two persons who shall have obtained the greatest number of suffrages at the first trial. In case of an equal number of votes, the operation shall be repeated, and should the result be the same, then the President of the Senate (the first time that of the Constituent Congress) shall decide it. No scrutiny or rectification of these elections can be made, unless three-fourth parts of all the members of the Congress be present.

Art. 85. The election of the President and Vice-President of the Nation, shall be concluded in a single meeting of the Congress, and thereafter, the result and the electoral lists shall be published in the daily-press.

Chapter III.

Attributes of the Executive.

Article 86. The President of the Nation has the following attributes:—

1. He is the supreme chief of the Nation, and is charged with the general administration of the country.
2. He issues such instructions and regulations as may be necessary for the execution of the laws of the Nation, taking care not to alter their spirit with regulative exceptions.
3. He is the immediate and local chief of the National capital.
4. He participates in making the laws according to the Constitution; and sanctions and promulgates them.
5. He nominates the Judges of the Supreme Court and of the Inferior Federal tribunals, and appoints them by and with, the consent and advice of the Senate.
6. He has power to pardon or commute penalties against officers subject to Federal jurisdiction, preceded by a report of the proper Tribunal, excepting in case of impeachment by the House of Deputies.
7. He grants retiring-pensions, leaves of absence and pawnbrokers licences, in conformity to the laws of the Nation.
8. He exercises the rights of National Patronage in the presentation of Bishops for the cathedrals, choosing from a ternary nomination of the Senate.
9. He grants letters-patent or retains the decrees of the Councils, the bulls, briefs and rescripts of the Holy Roman Pontiff, by and with the consent of the Supreme Court, and must require a law for the same when they contain general and permanent dispositions.
10. He appoints and removes Ministers Plenipotentiary and Chargé d'Affaires, by and with the consent and advice of the Senate; and himself alone appoints and removes the Ministers of his Cabinet, the officers of the Secretarships, Consular Agents, and the rest of the employés of the Administration whose nomination is not otherwise ordained by this Constitution.
11. He annually opens the Sessions of Congress, both Houses being united for this purpose in the Senate Chamber, giving an account to Congress on this occasion of the state of the Nation, of the reforms provided by the Constitution, and recommending to its consideration such measures as may be judged necessary and convenient.
12. He prolongs the ordinary meetings of Congress or convokes it in extra session, when a question of progress or an important interest so requires.
13. He collects the rents of the Nation and decrees their expenditure in conformity to the law or estimates of the Public expenses.
14. He negotiates and signs those treaties of peace, of com-

merce, of navigation, of alliance, of boundaries and of neutrality, requisite to maintain good relations with foreign powers: he receives their Ministers and admits their Consuls.

15. He is the commander in chief of all the sea and land forces of the Nation.
16. He confers, by and with the consent of the Senate, the high military grades in the army and navy of the Nation; and by himself on the field of battle.
17. He disposes of the land and sea forces, and takes charge of their organization and distribution according to the requirements of the Nation.
18. By the authority and approval of Congress, he declares war and grants letters of marque and reprisal.
19. By and with the consent of the Senate, in case of foreign aggression and for a limited time, he declares martial law in one or more points of the Nation. In case of internal commotion he has this power only when Congress is in recess, because it is an attribute which belongs to this body. The President exercises it under the limitations mentioned in art. 23.
20. He may require from the chiefs of all the branches and departments of the Administration, and through them from all other employés, such reports as he may believe necessary, and they are compelled to give them.
21. He cannot absent himself from the capital of the Nation without permission of Congress. During the recess he can only do so without permission, on account of important objects of public service.
22. The President shall have power to fill all vacancies that may happen during the recess of the Senate, by granting commissions, which shall expire at the end of their next session.

Chapter IV.

Of the Ministers of the Executive.

Article 87. Five Minister-Secretaries; to wit., of the Interior; of Foreign Affairs; of Finance; of Justice, Worship and Public Instruction; and of War and the Navy; shall have under their charge the dispatch of National affairs, and they shall counter-sign and legalize the acts of the President by means of their signatures, without which requisite they shall not be efficacious. A law shall determine the respective duties of the Ministers.

Art. 88. Each Minister is responsible for the acts which he le-

galizes, and collectively, for those which he agrees to with his colleagues.

Art. 89. The Ministers cannot determine anything whatever, by themselves, except what concerns the economical and administrative regimen of their respective Departments.

Art. 90. As soon as Congress opens, the Ministers shall present to it a detailed report of the State of the Nation, in all that relates to their respective Departments.

Art. 91. They cannot be Senators or Deputies without resigning their places as Ministers.

Art. 92. The Ministers can assist at the meetings of Congress and take part in its debates, but they cannot vote.

Art. 93. They shall receive for their services a compensation established by law, which shall not be increased or diminished, in favor or against, the actual incumbents.

SECCION 3d.

Of the Judiciary.

CHAPTER I.

Of its nature and duration.

Article 94. The Judicial Power of the Nation shall be exercised by a Supreme Court of Justice, and by such other inferior Tribunals as Congress may establish within the dominion of the Nation.

Art. 95. The President of the Nation cannot in any case whatever, exercise Judicial powers, arrogate to himself any knowledge of pending causes, or reopen those which have terminated.

Art. 96. The Judges of the Supreme Court and of the lower National-tribunals, shall keep their places *quamdiu se bene gesserit*, and shall receive for their services a compensation determined by law, which shall not be diminished in any manner whatever during their continuance in office.

Art. 97. No one can be a member of the Supreme Court of Justice, unless he shall have been an attorney at law of the Nation for eight years, and shall possess the qualifications required for a Senator.

Art. 98. At the first installation of the Supreme Court, the individuals appointed shall take an oath administered by the President of the Nation, to discharge their functions, by the good and legal administration of Justice according to the prescriptions of this Constitution. Thereafter, the oath shall be taken before the President of the Court itself.

Art. 99. The Supreme Court shall establish its own internal and economical regulations, and shall appoint its subaltern employés.

Chapter II.

Attributes of the Judiciary.

Article 100. The Judicial power of the Supreme Court and the lower National-Tribunals, shall extend to all cases arising under this Constitution, the laws of the Nation with the reserve made in clause 11 of art. 67, and by treaties with foreign nations: to all cases affecting ambassadors, public Ministers and foreign Consuls: to all cases of admiralty and maritime jurisdiction: to controversies to which the Nation shall be party: to controversies between two or more Provinces; between a Province and the citizens of another; between the citizens of different Provinces; and between a Province or its citizens, against a foreign State or citizen.

Art. 101. In these cases the Supreme Court shall exercise an appelate jurisdiction according to such rules and exceptions as Congress may prescribe; but in all cases affecting ambassadors, ministers and foreign consuls, or those in which a Province shall be a party, it shall exercise original and exclusive jurisdiction.

Art. 102. The trial of all ordinary crimes except in cases of impeachment, shall terminate by jury, so soon as this institution be established in the Republic. These trials shall be held in the same Province where the crimes shall have been committed, but when not committed within the frontiers of the Nation, but against International Law, Congress shall determine by a special law the place where the trial shall take effect.

Art. 103. Treason against the Nation shall only consist in levying war against it, or in adhering to its enemies, giving them aid and comfort. Congress shall fix by a special law the punishment of treason; but it cannot go beyond the person of the criminal, and no attainder of treason shall work corruption of blood to relatives of any grade whatever.

TITLE 2d.

Of the Provincial Governments.

Article 104. The Provinces keep all the powers not delegated by this Constitution to the Federal Government, and those which were expressly reserved by special compacts at the time of their incorporation.

Art. 105. They create their own local institutions and are

governed by these. They elect their own Governors, their Legislators and other Provincial functionaries, without intervention from the Federal Government.

Art. 106. Each Province shall make its own Constitution in conformity with the dispositions of Art. 5th.

Art. 107. The Provinces with the consent of Congress can celebrate contracts among themselves for the purposes of administering justice and promoting economical interests and works of common utility, and also, can pass protective laws for the purpose with their own resources, of promoting manufactures, immigration, the building of railways and canals, the peopling of their lands, the introduction and establishment of new industries, the import of foreign-capital and the exploration of their rivers.

Art. 108. The Provinces cannot exercise any powers delegated to the Nation. They cannot celebrate compacts of a political character, nor make laws on commerce or internal or external navigation; nor establish Provincial Custom-Houses, nor coin money, nor establish Banks of emission, without authority of Congress; nor make civil, commercial, penal or mining Codes after Congress shall have sanctioned those provided for in this Constitution; nor pass laws upon citizenship or naturalization; bankruptcy, counterfeiting money or public State-documents; nor lay tonnage dues; nor arm vessels of war or raise armies, save in the case of foreign invasion, or of a danger so imminent that it admits of no delay, and then an account thereof must be immediately given to the Federal Government; or name or receive foreign agents; or admit new religious orders.

Art. 109. No Province can declare or make war to another Province. Its complaints must be submitted to the Supreme Court of Justice and be settled by it. Hostilities *de facto* are acts of civil-war and qualified as seditious and tumultuous, which the General Government must repress and suffocate according to law.

Art. 110. The Provincial Governors are the natural agents of the Federal Government to cause the fulfillment of the laws of the Nation.

CHAPTER XX.

FINANCES, NATIONAL DEBT, CUSTOM-HOUSE LAWS, MONETARY SYSTEM, WEIGHTS AND MEASURES.

WITHOUT doubt, the weak point of the Argentine State is its system of Finance. At present, almost the only resources of the Federal Government are indirect taxes upon the revenues of its Custom-Houses, the importance of which depends entirely upon the condition of commerce; if it be flourishing, if there be a brick import and export trade, the receipts of the Government increase, whereas, during a commercial crisis they diminish. Inasmuch as the amount of the revenue depends upon the fluctuations of commerce, the Administration is not only unable to grant facilities to it in its import duties, but cannot assist it in any manner whatever, in its greatest straits. The Government itself suffers in all its branches from commercial crises, because in such a new country where so much is to be created as yet, it cannot procure a surplus in a good year, sufficient to cover a deficit in a bad one. On the contrary, all its income is immediately employed; improvements have to be introduced and new steps to be taken in all its branches; in a word, the country has to be raised-up.

Whenever the revenue does not reach previous estimates, or it is necessary to have recourse to a loan, or stagnation comes over the material progress which emanates from the Government of the country and depends upon its support and protection, the reaction is felt in turn by commerce in general, and therefore, a greater intensity and longer duration result from these disasters which are felt periodically.

To prove the imperious necessity of an efficacious reform in the Finances we must mention over and above these serious distur-

bances, the beyond-measure high-expense of collecting the taxes, which fully reaches the amount of 7 %. Doubtless the political organization of this country in this respect, presents serious difficulties. Inasmuch as the fourteen Provinces fix their own budgets, and consequently raise their own taxes, being in this respect, as well as in all others concerning their internal administration, completely independent, their interest might appear to be compromised if the Federal Government by levying upon their principal resources, raised direct-taxes within their jurisdiction. Thus there is no probability that Congress will present to the General Administration any tax-laws which could prejudice the Provincial system of taxes.

On the other hand, the vast possessions of the Republic present a sure and simple means of rendering the National Finances less dependent upon the income of the Custom-Houses. The Nation possesses millions of square-leagues of valuable lands, which do not produce a single dollar at present, whilst their reasonable explotation would produce millions per annum to the Treasury, either directly by sale, or indirectly by increasing production, and consequently consumption, either of which would increase the revenues of the State. But such methods of realizing the Argentine public-lands can only be effected by populating those which are not as yet exploited. This is an additional reason for attracting a good immigration.

A deficit of $ 2,000,000 gold, results from the statement of the Federal Finances which we adjoin; nevertheless, it is to be observed that the estimate of income is based upon a Custom-House law which was afterwards essentially modified by increasing the import duties.

Preliminary budget of revenue.

		Hard-dollars.
Import duties comprising an additional 5 %		14,090,000.00
Export „ „ „ „ 2 %		2,500,000.00
Deposit and Port-charges		475,000.00
Stamp-paper		460,000.00
Wharf-dues in the Riachuelo		16,000.00
Light-dues, etc.....		40,000.00
Telegraphs.....		80,000.00
Post-office.....		225,000.00
State-railways:—		
a. Line from Villa-Maria to Mercedes	25,000.00	
b. „ Primer Entre-riano	15,000.00	
c. „ from Córdoba to Tucumán..	30,000.00	70,000.00
Interest and amortization of loans granted to		

the Provinces of San Juan and Santiago, in National-Bonds.....	15,810.00
Id. id. of the Provinces of Mendoza and Rioja	27,100.00
Sundries.....	115,000.00
Product of loans to be made.....	2,145,695.00
Total..	20,259,605.00

The expenditures * amounted to the same sum; viz.—

I. Department of the Interior.

	Hard-dollars.	
1. Salary of the President †, Vice-President, private Secretary of the President, and expenses of his office and entertainments.....	41,160.00	
2. The Department.....	32,340.00	
3. The Congress.....	520,132.00	
4. Post-office.....	587,332.56	
5. Telegraphs.....	200,172.00	
6. Patent-office.....	4,908.00	
7. Bureau of Statistics.....	17,100.00	
8. „ of Agriculture.....	59,004.00	
9. Pensions.....	6,864.00	
10. Immigrant office.....	269,160.00	
11. Public edifices	190,000.00	
12. Roads and bridges	96,000.00	
13. Provincial subsidies	225,000.00	
14. Guarantees to railways.....	182,000.00	
15. Primer Entreriano Railway...	14,400.00	
16. Government of the Chaco territory.....	20,340.00	
17. Casual-expenses	20,000.00	2,485,912.56

Department of Foreign-Affairs.

	Hard-dollars.	
1. The Department.....	52,255.92	
2. Foreign Legations.....	167,676.00	219,931.92

* By decree of the Government the expenditures have been reduced, so as to balance the receipts.

† The Presidents-salary is $ 20,000; that of the Vice-President $ 10,000; and each of the five Ministers, receive $ 9,000 per annum.

III. Treasury Department.

	Hard-dollars.	
1. State Debt	7.892,898.68	
2. The Department	27,720.00	
3. Auditors Office	150,072.00	
4. Custom-Houses	1,274,279.20	
5. Stamp-paper	13,644.00	
6. Bureau of Public-Credit	16,560.00	
7. Pensions	14,268.00	
8. Fiscal edifices	72,000.00	
9. Bureau for the liquidation of the debts of the war of Independence	8,448.00	
10. Interest on loans	500,000.00	
11. Casual-expenses	48,000.00	10,017,889.88

IV. Department of Justice, Worship and Public-Instruction.

	Hard-dollars.	
1. The Department	56,376.00	
2. Courts of Federal-Justice	158,024.00	
3. Extras for „ „	2,400.00	
4. Pensions	2,400.00	
5. Casual-expenses for Justice	3,600.00	
6. The Episcopacy	183,648.00	
7. Ecclesiastical-subsidies	72,000.00	
8. Casual ecclesiastical-expenses	4,800.00	
9. Subsidies for primary-education in the Provinces	595,392.00	
10. Superior-education	588,315.36	
11. Purchase of text-books	12,000.00	
12. University and technical-schools	159,088.00	
13. Scientific Institutes	31,340.00	
14. Casual-expenses in the interest of public-education	12,000.00	
15. Special laws	5,000.00	1,886,383.36

V. War-and-Navy Department.

	Hard-dollars.
1. The Department	55,968.00
2. Head-quarters	53,592.00
3. Staff and soldiers of the war of Independence	285,054.00

4. Dispatch-steamers	175,824.00	
5. Standing-army	1,260,615.00	
6. General-staff	90,576.00	
7. Arsenals and Commissary-De-Department	202,968.00	
8. Food and clothing of the army	1,389,968.00	
9. Enlistment-offices	42,000.00	
10. Pensions and disabled-soldiers.	480,000.00	
11. Indian-Bureau	223,556.40	
12. Casual-expenses	234,000.00	
13. The Fleet	274,344.00	
14. Gun-boats building	108,000.00	
15. Torpedo-Division	35,844.00	
16. Port-authorities	155,880.00	
17. „ „ to be established	20,000.00	
18. Subaltern Port-authorities	87,494.00	
19. Naval-Cadets uniforms	7,200.00	
20. Casual Naval-expenses	70,800.00	
21. Rations for the Navy	90,000.00	
22. Naval-school and Military-College	78,272.00	
23. Special laws	227,532.00	5,649,487.40
	TOTAL:	20.259,605.12

National Debts.

The Debts contracted by the Argentine Republic are of two classes; viz., external and internal. The first, negotiated in England, amounted on the 1st January 1876, to £ 7,295,600 = $ 35,748,440 gold, as follows :—

	£.	Hard-dollars
English loan, 1868	1,950,600 =	9,557,940
Public-works loan, 1871	5,345,000 =	26,199,500
Total..	7,295,600 =	35,748,440

To this sum must be added the English loan to the Province of Buenos-Aires in 1824, because it was adopted by the Federal Government during the course of its payment; it yet however, bears the name of the said Province which is charged with its payment, and receives the funds from the General Government.

The Internal Debt arises from the emission of Bonds—*Fondos públicos nacionales*—the interest of which is paid, according to the balance of the Public-Credit Bureau of the 1st January 1876; it amounts to 21,032,506 hard-dollars. The total debt, therefore,

of the Argentine Republic at the commencement of said year, was $ 56,780,946 gold. This sum is covered in greater part by the railways, telegraphs, ports and public-edifices, shares, etc. which the Federal Government owns; the Public-Lands represent a value of several hundreds of millions, and are not even indirectly burdened, save as an absolute security which a country so full of vitality and wealth offers to its creditors, although their credits might be twenty times larger.

The Argentines discharge their compromises originating in these loans, with the greatest punctuality; the interest of the external debt is always paid to date, and the same exactitude is kept as regards the Sinking-Funds; and, although the rate, above all of the Internal Debt, is subject to considerable insteadiness, it should be attributed to the more or less extravagant rate of interest. The *Fondos públicos nacionales* only carry an interest of 6 %, whilst the market-price is generally from 10 to 12 %. The average price therefore, of these Bonds at from 75 to 80 % is very favorable; but it is hardly worth mentioning that they lower when the value of money rises to 15 or 18 %, yet even thus, they show a high quotation in proportion with the state of the money-market.

It is still to be observed that we only speak here of the debts of the Nation, not comprising those of the Provinces. For the rest with the exception of the small debts of the Provinces of Entre-Rios and Santa-Fé recently contracted in London, the Province of Buenos-Aires is the only one which has an external debt, as it is also, the only one which has an internal debt of some importance.

Custom-House law for 1876.

Art. 1. All foreign merchandise will pay an import-duty of 20 % *ad valorem.*

The following articles are excepted, which shall pay:

1. *A duty of* 40 %: Tanned-hides, starch, alcohol, arms, as well as their accessories, pieces, projectiles and cartridges, harness and harness-materials, with the exception of bits and stirrups which are considered as articles of large hardware, boots and shoes of all kinds, carriages, beer, cigars, cigarettes, match-boxes, and cigar or cigarette-pouches, fire-crackers, sweet-meats, fruit or vegetables in vinegar, fresh-fruit, hams, biscuit, vermicelli and other pastes made from wheat-flour, liqueurs and alcoholic-drinks, butter, furniture of all kinds, playing-cards, objects of art, gilt and painted paper, articles of perfumery, snuff and snuff-boxes, ready-made clothing and articles in general, cheese, tobacco, the

wines of Champagne, of the Rhine, of Burgundy, Sherry, Frontignac; muscat-wines, vermouth, and all wines in bottles, and fine-wines in cask.

2. *A duty of* 30 %: Glass-ware, wax-matches, driedf-ruits, building and cabinet-woods of all kinds, excluding those mentioned in the following paragraph, mercery and fine-hardware, porcelain, hats and caps of all kinds, tiles for roofing and flagging, stearin and spermaceti-candles, ordinary red-wines, the wines of Priorato, San Vincent, and other ordinary-wines in casks, yerba-maté.
3. *A duty of* 10 %: Jewelry, plows, sacking-cloth, steam-engines, gold and silver-ware, pine-lumber resinous or otherwise, ungalvanized sheet-iron, bar or pig-iron, also in leaves, common-salt, sewing and embroidering silk, all instruments or implements adorned with gold or silver, when these ornaments augment their value one-third.
4. *A duty of* 3 %: Unset precious-stones.
5. *A duty of* $ 1.60 *gold, per cent. kilograms of wheat, and* $ 0.04 *per kilogram on flour.*

Art. 2. Mercury shall be exempt from all import-duties; also fossil-coal, excepting that used for the manufacture of gas, staves and barrels or casks in wood or iron not mounted for packing, cattle on the hoof, iron-wire for fencing and telegraphs whether galvanized or not, powder and matches for mining-purposes, printing-machines and other utensils and materials which exclusively serve for printing-offices excepting types, steam-engines for vessels, and all those machines which the Executive may deem as specially destined to the creation of new industries, whether for for agriculture, or the mines, the arts or science; the furniture and tools of immigrants and those things exclusively destined to their establishment, on condition that they are their property and of small value; gold and silver stamped, in bars, grains or powder; unbound books, unsized white-paper specially for printing purposes, lithographic presses, such seeds as the Executive may consider cannot be applied to other purposes than agriculture, reapers, threshers, iron-rails, wedges and sleepers, buffers, points and crossings, railway or tramway wheels.

Art. 3. All previous laws of exemption from import-duties save in cases of special concession granted by law to an enterprise or to an individual, or contracts made by virtue of law, or approved by Congress, are hereby repealed.

Art. 4. All natural or manufactured products are free from export-duties, except the following which shall pay 4 % *ad valorem.*

Animal-oil, horns and shin-bones, dried and salted-meats, hair, hoofs, hide-cuttings, bones and bone-ashes, wool washed or unwashed, skins and hides, ostrich-feathers, tallow and grease.

Art. 5. The duties shall be calculated by a tariff of appraisment based upon the true price of the articles, in deposit for imported merchandize, and that for export, according to the prices of the market at the moment of embarkation.

The import-duties on merchandise not comprised in the tariff, shall be calculated upon the value which they represent in deposit, as per declaration of those who solicit their dispatch.

Art. 6. The Custom-Houses 24 hours after the appraisment may keep for account of the Public Treasury, all merchandise whose declared value may appear to be too low, and they shall immediately pay in Custom-House bills the price declared together with 10 $\frac{0}{0}$ more.

Art. 7. The Executive will designáte and fix the appraisment of merchandise and produce which ought to figure in the tariff, when they apply to art. 5, and the duty on washed and unwashed wool, ought to be the same.

Cotton-cloths, cambrics, fine-linens, and white or raw-colicoes and piece silk-stuffs, shall be included among the imports valued by weight.

Art. 8. 10 $\frac{0}{0}$ leakage shall be allowed for wines, oils, alcohol, beer and liqueurs, which come from ports beyond the Equator, and 6 $\frac{0}{0}$ from ports situated on this side. No leakage is allowed for merchandise coming from the mouth of the Plata..

A leakage of 5 $\frac{0}{0}$ is allowed on the same articles when they come in bottles.

The tare and leakage for all other articles shall be fixed in the *ad valorem* tariff.

Art. 9. Toleration of excess in articles of weight as fixed by the rules of the Custom-House remains limited to 3 $\frac{0}{0}$, and 2 $\frac{0}{0}$ for other articles as well as for excess in quality.

Art. 10. Export-duties shall be paid at the place of embarkation, whenever the merchandise is dispatched directly for foreign parts; it cannot be sent by water from one part of the country to another, unless the duties have been paid or security given.

Art. 11. Import-duties shall be paid by notes of hand to the satisfaction of the Collectors of the Customs, upon stamped-paper and four months after date.

Export-duties shall be paid cash, before the vessel be cleared upon which the produce has been loaded.

Art. 12. The payment of Custom-duties can be made in all the offices in lawful metal-money, in bills of the Provincial Bank of Buenos-Aires and the National Bank, payable at sight and to bearer, in paper-money of the Province of Buenos-Aires, or in Bolivian silver-coin at the market-rate until the Executive shall have fixed its value, according to the law on the subject.

Art. 13. The manifests for Custom-House dispatch shall be

made out in reference to weights and measures in accordance with the metrical decimal-system.

Art. 14. Land-transit is prohibited for merchandise which shall not have paid import-duties in some Custom-House of the Republic.

From this rule are excepted:—

1. Such merchandise as passes in transit by the ports of Concordia, Federacion and Paso de los Libres, to those of Brazil upon the river Uruguay.
2. Those which come from Chile to the Custom-House of Jujuí by the Province of Salta.
3. Those which pass in transit from the Custom-Houses of Buenos-Aires and Rosario, to those of Córdoba, Salta and Jujuí, and to Bolivia.

The Executive will guarantee this transit, by taking bonds for the payment of duties.

Monetary system.

The circulating medium among us is so badly arranged as yet, that no system of unity exists save in form, but there is no money whatever of a National character. The *patacon* or hard-dollar, may be considered to be a monetary unit—after a fashion, but it only represents a fictitious value, which beyond this, is not in usage throughout the country, and which in daily commerce is rarely employed. Formerly several of the Provinces had mints, which however, never acquired any importance and were suspended even before the acceptation of the new Federal Constitution in 1860, that took from the Provinces the right to coin money. From these circumstances it results that the want of a fixed standard in the country, has obliged the authorities to grant a legal course to foreign silver, thus giving to its coined-money a still more confused form.

In holding firm to the fictitious value of the *hard-dollar*, the value of foreign-coins was fixed as follows:—

The gold doubloon.....	$	16.00	cts.
The Brazilian 20 mil reis	„	10.00	„
The Chilean condor.....	„	9.25	„
The Spanish doubloon.....	„	5.00	„
English pound-sterling.....	„	4.90	„
20 francs piece.....	„	3.90	„

As may be seen, the hard-dollar has the same value as a dollar in gold in North America, or the Spanish *duro*.

Alongside of these gold-coins and their divisions, we have also silver-coins, above all, the badly-reputed Bolivian piece of 50

cents.—which is almost exclusively in use in the Interior of the Republic—and the Brazilian piece of 1000 reis. On the contrary paper-money, or *papel moneda corriente*, emitted by the Bank of the Province of Buenos-Aires is the money of the said Province, and is so domesticated that it is preferred in common life even to gold-coin. It is the real money of the Province and merits this confidence of the people since a bureau of exchange for it was established, by which it can be exchanged at all times for gold at the fixed price of 25 *pesos* current-money for one hard-dollar. The Banks of the other Provinces which have the right of emission, for the most part print bills in Bolivian value, excepting always the National Bank, which only circulates bills in hard-dollars. As we have already said, Bolivia has so inundated the Argentine Republic with its depreciated silver-coin, that it takes the same place in the Interior as the paper-money in Buenos-Aires.

To put a stop to such an obstacle to public and private prosperity, Congress passed a uniform currency law on the 25th Sept. 1875, which was at once approved by the President. This law makes the gold-dollar the monetary unit, by which the name of hard-dollar is preserved, and fixes its weight at one gram and two-thirds, of gold of $\frac{900}{1000}$ fine. The hard-dollar is divided into ten dimes of ten cents each, and the cent into ten mills.

Gold-coins of a greater value, will be stamped as follows:—

1. The half-colon, of the value of 5 dollars, weighing 8 grams and 333 milligrams.
2. The colon, value 5 dollars and weighing 16.666 grams.
3. The double-colon of 20 dollars, weighing 33.333 grams, all of $\frac{900}{1000}$ fine.

Silver-money will be coined as follows:—

1. The silver-dollar, of equal value with the hard-dollar, weight 27.110 grams.
2. Fifty cents = $\frac{1}{2}$ hard-dollar of the weight 12 $\frac{1}{2}$ grams.
3. Twenty cents = $\frac{1}{5}$ " " " 5 "
4. Ten cents = $\frac{1}{10}$ " " " 2 $\frac{1}{2}$ "
5. Five cents = $\frac{1}{20}$ " " " 1 $\frac{1}{4}$ "

The silver is $\frac{900}{1000}$ fine.

Also:

1. Two-cent pieces, weight 10 grams.
2. One " " " 5 "

These two last are coined of 95 parts copper, 4 parts of tin, and one of zinc.

The law is quite full of details, and before it can go into operation it will be necessary to construct preparatory works of great importance, which require time and will delay its execution; but once

in execution it will exercise the best influence in more than one respect, upon the development of the country. Not only it will radically cure the monetary chaos which now prejudices commerce in general, but it will also impede the reappearance of these monetary crises which are so disastrous, and now periodically afflict the country.

At present almost all the gold-coins are imported principally from England, whence results that under unfavorable conditions of exchange they are re-exported, and consequently a great diminution takes places in the reserve of the Bank. It is very natural that the Money-Market is much influenced by this dribbling away of the precious metals. The silver-coins being of most value in their own country, will not be so much subject to exportation; they will rather take the place of the foreign-silver which as yet only represents an article of commerce. So much the better for the country, inasmuch as it will have a greater stability in its circulation. Another very essential advantage in the establishment of these Mints—of which the law prescribes two, one in Buenos-Aires, and the other in the city of Salta, capital of the Province so-called—is the creation of a domestic-market for the products of our mining-industry.

Weights and Measures.

A still greater confusion exists in the Weights and Measures of our country, than in its money. Although the metrical system has been for some years already officially introduced, it has not as yet become naturalized, and it is even to be feared that it will not come into general use so soon as desirable, if the authorities do not proceed to vigorous measures.

We give here the weights and measures most usual in this country, with their respective comparisons; but only the most usual, because the difference is so considerable among those of the same name in different parts of the country, that it would take too much space to mention them all.

Measures of length.

1 inch *(pulgada)*				=	0.024	meters
12 inches	=	1 foot		=	0.289	„
3 feet	=	1 *vara*		=	0.866	„
100 varas	=	a block of houses		=	86.600	„
150 „	=	a square		=	129.900	„
6000 „	=	a league		=	5.196	kiloms.

Therefore, 1 metre = 41.570 *pulgadas* or inches = 3,464 feet = 1,155 varas.

1 Kilometer = 1154.734 varas = 11.547 *manzanas* or blocks
= 7.698 *cuadras* or squares = 0.192 of a league.

Square Measures.

1 inch □ = 5,787 centimetres □
1 foot □ = 0,083 metres □
1 *vara* □ = 7,750 „ □
1 block □ = 0,750 hectare □
1 □ = 1,687 hectares □
1 league □ = 2699,842 „ □
Therefore; 1 meter □ = 1728,102 inches □ = 12,001 feet □
= 1,333 *varas* □ and
1 Hectare = 13334,116 *varas* □ = 1,333 blocks □
= 0,593 blocks □

Cubic Measures.

1 cubic inch = 13,920 centimetres ⧈
1 „ foot = 24,054 decimetres ⧈
1 „ *vara* = 0,649 metre ⧈
Therefore; 1 centimetre ⧈ = 0,072 cubic inches or *pulgadas*.
1 decimetre ⧈ = 0,042 of a cubic foot.
1 metre ⧈ = 1,540 cubic *varas*.

Grain Measures. *

1 *cuartilla* = 34,299 litres.
4 *cuartillas* = 1 *fanega* = 137,198 „
Therefore; 1 litre = 0,029 *cuartillas* and
1 hectolitre = 0,729 *fanegas*.

Liquid Measubes.

1 *cuarta* = 0,594 litres.
4 *cuartas* = 1 *frasco* = 2.375 litres.
1 gallon = 3,800 „
20 gallons = 1 barrel = 76,004 „
6 barrels = 1 pipe = 456,026 „
Therefore; 1 litre = 0,421 *frasco* = 0,263 of a gallon.
1 hectolitre = 26,314 gallons.

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* The grain measures not only differ in the different Provinees, but even in different places of the same Province. Thus the *fanega* of Buenos-Aires of 137,198 litres, filled with wheat, weighs from 210 to 215 lbs, whilst the *fanega* of Santa-Fé divided into 12 *almudes*, weighs with wheat, 375 lbs., and at Entre-Rios on the Paraná shore 400, as against 210 to 225 lbs. in the districts of the Uruguay. The *fanega* of maize in the ear, ought to weigh 300, and in the grain 400, pounds.

Weights.

1	grain			=	0,050 gram.
36	grains	=	1 *adarme*	=	1,795 grams.
16	*adarmes*	=	1 ounce	=	28,713 „
16	ounces	=	1 pound	=	0,459 kilog.
25	pounds	=	1 *arroba*	=	11,485 „
4	*arrobas*	=	1 quintal	=	45,940 „
20	quintals	=	1 ton	=	918,800 „

Therefore; 1 gram = 20,061 grains
1 kilogram = 2,177 pounds and
1 metrical ton = 21,768 quintals = 1,088 ton.

Fine-Weights.

	grain			=	0,050 gram
576	grains	=	1 ounce	=	28,713 grams.
8	ounces	=	1 mark	=	229,700 „

Therefore; 1 gram = 20,061 grains.
1 kilogram = 34,828 ounces = 4,353 marks.

Apothecaries Weights.

1	grain			=	0,050 gram.
12	grains	=	1 *ovalo*	=	0,598 „
2	*ovalos*	=	1 scruple	=	1,196 grams.
3	scruples	=	1 drachm	=	3,589 „
8	drachms	=	1 ounce	=	28,712 „
12	ounces	=	1 pound	=	0,345 kilog.

Therefore; 1 gram = 20,060 grains = 1,672 *ovalos* = 0,836 scruples = 0,279 drachm and
1 kilogram = 34,828 ounces = 2,902 pounds.

Approximately therefore:

15	*varas*	=	13 metres
4	*varas* □	=	3 „ □
20	*varas* ▭	=	13 „ ▭
43	*fanegas* of Buenos-Aires	=	59 hectolitres
5	gallons	=	19 litres
37	pounds	=	17 kilograms
12	tons	=	11 metric tons
74	marks	=	17 kilograms
90	apothecary's pounds	=	31 kilograms.

CHAPTER XXI.

PUBLIC INSTRUCTION AND THE PRESS, SCIENTIFIC INSTITUTIONS, RELIGION, ETC.

It is not long since the Argentine Republic was behind its neighboring States in Public Instruction; but it now surpasses them all in this essential point, for the public-schools are better developed here than in any other South American State. It is true that this victory, for which the country ought to be more proud than for the glories of its arms, has been won over rivals which occupied a very low position in this matter, but yet they held two chief advantages over us in possessing greater homogeneousness of population, and more or less strongly centralized administrations. We principally allude to the two neighboring States of Chile and Brazil; they contain a much less cosmopolitan people, and moreover, possess consolidated governments, whilst the Argentine Republic must assimilate thousands of new-comers, and the basis of its administration is a decentralization pushed to the extreme. It is certainly proper in all ways to favor "self-government" as a principal, and particularly to leave the origination of the public-schools to the districts, limiting the intervention of the Government to a subsidy in those cases, where the means of the district may be insufficient. This is the principal sustained here; at all events, the Federal Government has no authority to interfere directly with elementary instruction, and it only sends to the Provincial Governments such pecuniary aid as may be determined by law, or granted by special decrees. Now there are cases—by no means isolated—in which the district is not prosperous, and therefore "self-government" is found in a problematic condition. Here the interference of the Government would be perfectly proper, but the corresponding Provincial Gov-

ernment being frequently unable to provide any remedy, it ought to become the duty of the National Government to do so; thus a greater centralization in this important branch of public-life would often be a incontestable advantage. This state of things is felt above all, in those districts where the foreign element predominates, and it is a proved fact that on account of the large immigration hither, the proportion between the children who frequent the schools and those who grow up in ignorance, is very unfavorable to the former. This circumstance is explained in part by the class of the majority of these immigrants, and in part, because the agricultural establishments founded by these new-comers are wanting in national homogeneousness, which is an obstacle to any unity of effort towards a common end. Thus we see that Public Instruction where European immigrants sensibly predominate, is in a condition but little satisfactory, as also, that a general want of a tendency towards civilization is felt in a high degree amongst the greater part of these foreigners. And yet the immigrants are in a better position to acquire school-instruction for their children than the indigenous inhabitants; for whilst the latter are generally dispersed over the open country, and often live 20, 30, and even 50, leagues from a populous center, the former are established as a rule in villages where schools are not wanting, or else they found new ones themselves, where primary schools can be established for their children without any great effort.

In view of these indications a sufficiently correct idea can be obtained of the difficulties which obstruct the propagation of Pubic Instruction here. Some men among us it is true, have acquired reputation for their efforts to conquer them, but their success is due in great part, to the great fertility of the field they undertook to cultivate. If the people themselves had not fully recognized the great importance of Public Instruction; if they had not met the efforts of these men half-way; or rather, if they had not encouraged the progress of Public Education; good schools might have been established, but the Argentine Republic, in view of the limited power of the Government, would never have reached the point where it now is in this respect. The fact alone that eminent statesmen in all respects are always placed at the head of the Department of Public Instruction, characterizes the importance which is attributed to this branch of Administration. Assisted by the annual report for 1874, of the present Minister Sr. O. Leguizamon, who is a man full of merit, we will give an exposition in a few words of the actual state of Public Instruction in the Argentine Republic. Nevertheless, it is not improper to premise a retrospective sketch of the development of Secondary Instruction, as closely allied with that of the National University of Córdoba.

As many grave reproaches can be made against the Jesuits as may be desired, but no intelligent man can deny the great services which they have rendered heretofore to education and civilization. Thus also, our country owes much to them in this respect. They founded schools and Academies, and, if it is true that their methods of teaching no longer suffice for the demands of our age, they at least served as a basis for future development. At several points in the regions of the Plata, the Jesuits founded novitiates and schools; and, in the year 1611, their *Colegio*—thus they called their religious houses—of Córdoba, was declared to be the *Colegio Maximo* of the Provinces of their order; *i.e.*, of Paraguay, comprising La Plata and Chile. This College possessed a novitiate and a latin-school. Their hardy firmness in favor of the oppressed Indians alienated persons of fortune from them, and they met with such slight support that the teachers and scholars were obliged to emigrate towards Santiago de Chile one year after. Little by little however, the public spirit changed in their favor. First they gained the women, then the men; and when in 1613, Fresco de Sanabria, the Bishop of Tucumán, although a Franciscan, presented the Jesuit-school with an annual income of 2000 dollars, the College of *San Francisco Xavier* was all ready to be opened on 29th June, under the direction of Father Alvir. Theology, philosophy, and latin-grammar were taught, and the number of pupils soon rose to 60. This College was the basis of the University of Córdoba, the second in antiquity of South America. *San Marcos* of Lima, which received the royal confirmation of Charles V. in 1551, is the most ancient.

In 1613, the Jesuits had already undertaken to obtain permission from the King of Spain to establish other Universities in his American possessions; this was granted to them in 1621, and confirmed by a bull of Pope Gregory XV, under date of 8th August in the same year.

Thus a "Royal University" was built in the year 1622 alongside of the College of San Francisco Xavier, and in the following year it granted degrees in Theology and Arts—Grammar and Philosophy.

This University was dedicated to St. Ignatius, the founder of the Society of Jesus, who had been canonized shortly before; it only embraced these two Faculties, whilst the Universities of *San Felipe* in Santiago de Chile, and *San Francisco Xavier* in Chuquisaca, taught Jurisprudence also. It appears that the Bishop of Tucumán had made rather a free usage of his privilege to grant academic degrees, because there is a royal Ordinance of 1664 that degrees cannot be granted except at Córdoba, and then with all due formalities. It appears that the University was only for-

mally established in this same year; the Jesuit Andrés de Roda prepared the by-laws, and the Rector and Professors held the first claustral meeting on 1st Decembre 1664.

Assisted by a gift of $ 30,000 from Dr. Duarte de Quiros, these indefatigable priests founded another school at Córdoba, called the *Colegio de Monserrat*, which always remained in connection with the University. On the other hand, the ancient College of *San Francisco Xavier* was converted into an Episcopal Seminary under the name of *Colegio de Loreto*, and then the residence of the Bishop was transferred to Córdoba in 1770. The two Institutes somewhat changed in character, yet exist alongside of the University.

The latin language was the basis of the studies; the pupils had to acquire a great facility in its use by adopting it for both prose and poetical compositions. The study of scholastic philosophy which was taught according to the approved books, followed that of grammar, and thereafter came scholastic and moral theology. The iron discipline which reigned in this Institution was evidently the most important means of education, but the celebrated Dean Funes declared that this system was even then unfit to form worthy citizens, either in a physical or moral point of view; and others said, "that the American Colleges had never been anything else but clerical seminaries where the pupils were subjected to exaggerated religious exercises, which deprived them of the time that should have been dedicated to more useful things."

In the month of July 1767, the Jesuits were expelled from all the Spanish dominions; their properties were confiscated, and the University of Córdoba was entrusted to the Franciscans, who kept its administration until 1807. The liberal-minded Minister Aranda at the epoch of the expulsion, proposed a reformation of the Secondary Instruction, by which it would be withdrawn from the hands of the regular clergy, and the confiscated properties of the Jesuits be employed in its improvement. The Spanish Universities and the Colonial authorities were invited to make propositions to this effect, and whilst the ancient University of Salamanca made a retrospective report, the *Cabildo*—Chapter—of Buenos-Aires manifested liberal ideas. At this time Buenos-Aires had already been declared the capital of the new Vice-Royalty, and it desired a University, or else the transfer of that of Córdoba, as already had been done with the greater part of the library and the printing-office of the Jesuits, which were the first established in the States of La Plata; only one other—that of Lima—then existed in South America. Yet it was not until 1783, that a Royal College—a latin school—was founded in Buenos-Aires, but without the privileges of a University.

This liberal action of Spain was soon dissipated, and as a

consequence of the great rebellion of the Indians under Tupac Amarú in 1781, she increased the rigor of the vile principles of her Colonial policy. The Jesuit Iturri speaks of three branches of instruction to which the Americans ought to be limited, and which it was proposed to establish on the ruins of the American Universities; viz., reading, writing and arithmetic.

Meantime the University of Córdoba sustained itself under the direction of the Franciscans; the Jesuits who had been the best teachers—and with them many of the pupils—had departed. Its new constitution composed in 1784, by the Bishop of Tucumán, J. A. de San Alberto, contained no reforms, save, that by the demand of Sobremonte, the Governor of Córdoba, the shadow of a school of Jurisprudence was introduced. By a royal order of 1st December 1800, it was reorganized under the name of the *Royal University of San Carlos and of our lady of Monserrat*, all corporations of the regular clergy being excluded. The new University embraced three faculties: Theology, Civil and Canon Law, and Philosophy; the two first with four professors each, and the latter with five professors.

The by-laws were to be the same as those of the University of Lima in 1735, and the studies were to conform to those of the University of Salamanca in 1771. This royal order however, was only put into execution in 1807. Father Pantaleon Garcia was the Rector at that time, a post he had held for 19 years, although it appeared that the decree of his election had never been legally executed. Nor had the regency of the Franciscans been well esteemed, as may be imagined from the tumultuous scenes which took place against the Rector when he left. Gregorio Funes, canon of the cathedral, afterwards took charge of the rectorate.

Meantime, the want of Secondary Instruction was felt more and more at Buenos-Aires. The presence of European *savants*, as well as of the Commissioners appointed for the demarcation of the frontiers with Brazil; the demands of navigation and of the survey of lands, etc. excited this want, and the public voice said, "We require useful knowledge, instead of all these absurdities by which you make us priests, nuns, and pettifogging lawyers." Schools, an Academy of Mathematics and a branch of Engineers, and also an Academy of Design were started, but all ceased to exist in a short time. Some scientific and literary societies lasted no longer.

It was only after the disappearance of the Spanish rule, that the University of Buenos-Aires was founded—in 1821—in which Theology, Jurisprudence, Medicine and the Natural Sciences were taught. Bonpland, the celebrated companion of Humboldt, was among its professors, and President Rivadavia brought from Europe Dr. Lanz, a mathematician, and Carta, Doctor of physics, as well as scientific collections and apparatus.

The activity of these European *savants* did not last long: Dr. Carta had a successor who only remained three years. During the dictatorship of Rosas, it appears that these studies were entirely forgotten, and it is only lately that the Natural Sciences have been again undertaken in a splendid manner, which augurs the best results for the honor of the University of Buenos-Aires.

In the secularized University of Córdoba nothing essential had been changed. Funes drew up a new schedule of studies in 1832, which made but little improvement.

The Central Government of the Confederation, which resided at the small village of Paraná in 1858, decreed a new Constitution for the *Universidad mayor de San Carlos y Monserrat*, which did not contain any efficacious reforms either. Nor had the investigations of a Commision, ordered by the new Government of the Argentine Republic to reform Public Instruction, any other memorable result, than the separation of the College of Monserrat from the University in 1864: it then took the name of National College. The Faculty of Theology also passed to the College of Loreto, leaving the University only the Faculty of Jurisprudence.

At the comencement of this chapter we asserted, that the Argentine Republic is the most advanced in Public Instrution of all the States of South America. In the annual report of the Minister already cited, we find a comparison based upon official documents, which clearly proves the fact.

ATTENDANCE AT THE PRIMARY SCHOOLS, IN THE THREE PRINCIPAL STATES OF SOUTH AMERICA.

	Argentine Rep.	Chile	Brazil
Population, including Indians..	1,836,490	2,039,767	11,780,000
Children from 6 to 16 years...	459,122	509,941	2,945,000
Number of Primary Schools, public and private.....	1,830	1,256	4,593
Pupils in Primary Schools.....	112,223	80,609	151,416
Students in Academies and Universities.....	4,980	3,213	3,642
Total number of scholars.....	117,203	83,812	155,058
Total of children not attending schools.....	341,919	426,129	2,789,942
Proportion between population and number of schools.....	1 per 992.65	1 per 1,642.01	1 per 2,564.77
Proportional numbers of scholars and population.....	1 per 15.66	1 per 24.33	1 per 75.32
Annual expense of public instruction, in gold dollars....	2,425,259	1,133,354	2,356,738

NUMBER OF SCHOOLS AND PUPILS WHICH ATTEND THEM IN THE 14 PROVINCES OF THE ARGENTINE REPUBLIC

Provinces	Public Schools.					Private Schools.					TOTAL NUMBER OF SCHOOLS.	TOTAL NUMBER OF PUPILS.	CENSUS POPULATION WITHOUT INDIANS.
	SCHOOLS			PUPILS		SCHOOLS			PUPILS				
	Boys.	Girls.	Mixed.	Boys.	Girls.	Boys.	Girls.	Mixed.	Boys.	Girls.			
Buenos-Aires	117	65	101	8719	10246	86	32	160	7998	6346	561	33309	495107
Catamarca	13	6	11	1261	620	1	2	3	53	111	36	2045	79962
Córdoba	50	30	2	2036	1390	7	11	—	400	467	100	4293	210508
Corrientes	90	36	—	4700	3260	8	16	—	600	520	150	9080	129023
Entre-Rios	119	20	35	3471	2599	12	10	14	740	930	210	7740	134271
Jujuí	17	12	—	670	458	—	1	1	15	70	31	1213	40379
Mendoza	43	22	12	4008	2452	3	4	3	370	266	87	7096	65413
Rioja	29	19	1	1980	1340	—	—	—	—	—	49	3320	48746
Salta	30	13	29	2066	1649	2	2	2	168	69	78	3952	88933
San Juan	26	3	37	4018	2798	4	—	9	255	183	79	7254	60319
San Luis	55	36	22	3613	2943	1	1	1	65	47	116	6668	53294
Santa-Fé	44	14	7	7960	1084	16	15	6	1011	633	102	10688	89117
Santiago	58	11	1	26 7	926	24	14	6	1392	1160	114	6085	132898
Tucumán	14	7	70	4229	2569	3	4	5	274	126	103	7198	108953
Total	705	294	328	51338	34331	167	112	210	13341	10928	1816	109941	1736923
	1327			85672		489			24269				
Add the evening schools for adults, adjuncts of the National Colleges											14	2282	
											1830	112222	

We add a second statistical resume, for the purpose of giving a still more general sketch of primary instruction in the Argentine Republic, during 1874:—

Provinces.	Children of School-age.	Children attending School.	Remainder not attending School.	Proportion of scholars to population.	Number of Schools.	Cost of Primary Schools.		
						National subsidies. Gold-dollars.	Provincial subsidies. Gold-dollars.	TOTAL Gold-dollars.
San Juan	15387	7294	8093	1 por 6.95	182	23613	331149	56762
San Luis	16440	7003	9435	1 „ 8.15	116	34962	15404	50366
Santa-Fé	23138	10898	12240	1 „ 8.48	147	7000	41887	48887
Mendoza	18203	7504	10709	1 „ 9.43	161	45880	46384	92264
Corrientes	37213	9253	27960	1 „ 14.32	161	10447	72495	82942
Rioja	14503	3576	10927	1 „ 14.77	49	15000	5112	20112
Buenos-Aires	120039	33396	86643	1 „ 14.92	1287	4166	914746	918912
Tucumán	31964	7247	24717	1 „ 15.16	144	35257	54239	89496
Entre-Rios	36840	7819	29021	1 „ 17.43	210	33200	16200	49400
Santiago	35704	6373	29391	1 „ 21.97	114	6664	8592	15256
Salta	24024	4072	20052	1 „ 22.01	113	23400	15950	39350
Jujuí	10433	1247	9186	1 „ 33.22	41	8374	2791	11165
Catamarca	22868	2218	20650	1 „ 39.18	36	2741	11262	14003
Córdoba	62221	4323	57898	1 „ 49.04	107	6558	19675	26233

It might be supposed that the Federal Government in contributing to the cost of Public Education, operated according to its own caprice, but it is not so: on the contrary, it is obliged observe certain conditions; for example, it must contribute one third of the expenses of the schools as soon as it is proved that some Provincial or District authority, or an association of citizens has raised the other two-thirds of the sum required and approved of. The Central Government is equally compelled to pay the annual sum of $ 10,000 gold to every Province which has 10 % of its inhabitants at school; which sum must be employed in the interest of Public Instruction.

Good schools arise for the most part from good teachers. A great want is felt in this respect at present, although it has been attempted to attract foreign instructors as much as possible, yet without much success. Above all, this is the case in the primary schools, where it is often obligatory to entrust the teaching to persons possessed of little knowledge. It is much easier to recognize this misfortune than to overcome it, because teachers cannot be improvised; they may be made however, and this has been undertaken most seriously. Normal schools have been established under the National Government for some years already, and the Province of Buenos-Aires also maintains similar establishments at its own expense. The last session of Congress decreed the increase of these Institutions at the National expense, to which a particular attention is to be given for the purpose of attracting the fair-sex as teachers.

Primary education is already obligatory in some of the Provinces, although naturally, not in an absolute sense; as, for instance, in far distant districts where within ten leagues diameter perhaps not five or six school-children may be found, there are particular difficulties in the way of uniting them for the purposes of instruction. Thus, in this view, a dispersed population is a great obstacle to progress, although at the same time it proves the zeal with which the intellectual culture of the people is pushed.

There is no other country where so many local obstacles have to be combated, and if, notwithstanding all, the Argentines have placed themselves at the head of South America in respect to Public Education, they are really to be congratulated upon their success.

We have already made the observation that European immigration exercises an influence more embarrassing than favorable upon the attendance at school, and the plain proof of this is found in our last table.

Only a limited number of these immigrants live in the Provinces of San Juan, Mendoza and San Luis, nevertheless, the number of pupils in them is surprising. The Province of Santa-Fé is their

principal residence: it also pretends to a pre-eminent position, bnt it has only recently acquired it thanks to the energetic measures of the Government, which among others, makes school-attendance obligatory; such a rule in an agricultural community where population is more dense, ought to have full success. In the Province of Santa-Fé during 1869, only 4303 children profited from Public Intruction; our table give 10,898 for the end of 1874.

The Province of Buenos-Aires—the richest and most advanced of the Republic—only takes the seventh place in the said table; of 120,039 children of school-age, only 33,396 attended, and the proportion between pupils and population is as 1 to 14.92. Since 1869 when the Census was taken, there is no progress to relate, because there were then 28,363 pupils, and according to Dr. Faustino Jorge, Chief of the Statistical Bureau of the Province, in his *Registro Estadistico de la Provincia de Buenos-Aires, año* 1872—an excellent work, very rich in details, and from which we have taken the greater part of our notes upon the said Province—the number of children attending school in that year was only 32,317; the successive augmentation proceeding rather from that of the inhabitants, than from any progress in Primary Education. At present on the contrary, we must acknowledge such a total change in the state of affairs, that owing to the regulation of the system which has been carried out with the greatest energy, this Province not only much surpasses the whole of South America, but also many of the European States. It is however, to be remarked, that it is proud of owing this success exclusivly to its own efforts; although it possesses the legitimate right, from principle, it will not have any recourse to the contributions of the Nation.

In passing to the subject of Secondary Education we find at first glance, that the action of the National Government is much more pronounced. In each of the Federal Provinces it sustains a *National College*, as they are called, institutions specifically Argentine, bearing some resemblance to the establishments of other countries, without being equal to any, either as regards their organization or plan of studies. They serve as preparatory schools for the University, in this respect resembling the German Gymnasiums, and also, to teach technical information to their pupils; to this end some of these "Colleges" are connected with special schools. Thus the theoretico-practical agricultural schools of Salta, Mendoza and Tucumán, are found alongside of the "Colleges." In these latter the course is fixed at six years, and they are well supplied with professors; among whom are men of true science who enjoy throughout the Republic the reputation of *savants;* nor can we sufficiently recommend the liberality of the National Government when it desires to procure for these establishments foreign

Professors of profound knowledge. It is proper to mention once more, that in all affairs connected with Public Instruction, the Government, as well as the people in general, spare no sacrifice.

If we have frequently mentioned this fact, it is owing to its great importance, and it is a guarantee of non-interrupted progress in this branch of public-life, as well as of the whole country, because the Sciences are every where a Power, and yet no where more than among us, whose natural treasures are as yet unexploited.

The 14 National Colleges and adjoining special-schools were attended in 1874 by 1808 scholars, whilst the University of Córdoba held 129 students; thus the aggregate of those who received a Secondary Education in the National Institutes, amounted to 1937.

The Provincial and private establishments counted 1548 scholars, and the University of Buenos-Aires, including its preparatory classes, was attended by 1495 students. These make a total of 4980 young people who participated in the Secondary Education given in the public and private Institutions of the country.

The budget for 1876 contains $ 554,879 gold, for the National Colleges, and moreover, $ 23,436 for the adult evening-schools. In addition, $ 9,600 for the law-schools of Tucumán and Concepcion del Uruguay; $ 69,528 for the three agricultural schools, and $ 24,000 for the two schools of mines. The sum destined as subsidies to Primary Education for the same year is $ 493,776, and $ 86,920 belong to the two Normal Schools of Paraná and Tucumán. At the same time the necessary funds have been granted for new Seminaries of male and female teachers. The University of Córdoba figures in the budget of expenditures for the amount of $ 55,960, and the Observatory and Meteorological Bureau take $ 31,340.

The University of Córdoba, of which we have already sketched the history to the year 1864, received a new impulse under the administration of Sr. Sarmiento, in the foundation of an Academy of Exact Sciences. The celebrated German *savant* Hermann Burmeister, having resided some years in this country in pursuit of science, was commissioned to procure European professors to teach in this Academy, which in reality was a Faculty of Natural Sciences outside of the University. The said naturalist fulfilled his compromise, but soon difficulties arose which determined Mr. Burmeister to withdraw from the direction of the Academy, which a short time after was incorporated to the University as a Faculty of Natural Sciences by Dr. O. Leguizamon, Minister of Public Instruction; this disposition corresponds better than the first one, to the views of its foundation. The University of Córdoba now contains two faculties, that of Jurispru-

dence and that of Natural Sciences, to which will soon be added according to the determination of Congress, a Faculty of Medicine.

We have seen above, that the new University of Buenos-Aires struggled for some time with many contrarieties, and consequently could not acquire a greater scientific importance. Fortunately also, its affairs have taken a more favorable turn, so that to-day it surpasses many similar establishments of South America, and even in more than one point may compare with those of the North, although it is at present partly in a state of reorganization. It has now five Faculties, and whilst the University of Córdoba has only 14 Professors, that of Buenos-Aires has 68, according to the budget for 1876; and the subsidy of the Province is calculated at $ 200,000 gold.

The annual salaries of the professors amount to an average of $ 2400 each, but inasmuch as one professor often teaches several branches he draws consequently a double or triple salary; thus the complaints of European professors about their poor rewards, cannot really find echo in this country, for not only the professors of the University, but also those of other institutions, and even the teachers in the primary-schools, are honorably remunerated, and enjoy a good social position. Moreover, the Representatives of the people are never more disposed to grant pensions, than when a teacher of merit is the petitioner.

If, in general, political considerations decide the choice of the highest offices, it is not so with the Department of Public Instruction, which is only entrusted to recognized special abilities. Thus under the Administration of General Mitre, Sr. Eduardo Costa was the Minister of Public Instruction. The political circumstances of the period—which included the Paraguayan War—prevented him from doing greater things during his management. Sr. Sarmiento, the first school-master of the Argentines, at present the Chief of the schools of the Province of Buenos-Aires, was the successor to General Mitre in the Presidency of the Republic; his Minister of Public Instruction, Dr. Avellaneda, succeeded him in the Presidential Chair, and nominated Dr. O. Leguizamon to the Department he had just left. Thus it cannot be denied that the Argentine people very well understand the importance of a public, general, and fundamental culture, and that the earnestness with which they labor for the development of education cannot be compared to a fire of straw, but on the contrary that it has taken root in the public conscience, and will therefore be fruitful and durable.

In the course of this book we have several times proved that the Argentines are at present occupied in familiarizing the sciences

among them; therefore, we declare that it would be injust to compare their scientific establishments in their present state of infancy, with those of older peoples, or of an older civilization. But they are not entirely destitute of purely scientific establishments, and have two which enjoy a high reputation in all parts of the civilized world. First, the Provincial Museum of Buenos-Aires, which under the direction of Mr. Burmeister has rapidly acquired a great importance, principally due to its rich collection of animals of the primitive world—fossils. Then, the National Observatory of Córdoba, of a more recent origin but of greater practical importance, was founded under the administration of Sr. Sarmiento. The astronomer B. A. Gould from North America, a name known throughout the scientific world, was appointed the Director from the beginning. His work will soon be published upon the results already obtained, and will not fail to be received and recognized as an important addition to this science.

The Bureau of Meteorology allied to the Observatory, is as yet under organization; much may be expected from its observations.

No are scientific societies wanting in this country, although as yet, they have not attained important proportions. The students of our Universities—the young Argentines—assist at these meetings with much zeal. The most important of these Corporations are the Argentine Scientific Society, and the Argentine Zoological Society. The former was founded a short time ago and domiciled in Buenos-Aires, and its principal object is the cultivation of technical science; the latter is domiciled at Córdoba, where it is presided by Dr. Weyenbergh, the Professor of Zoology in the University of that city.

The importance of Public Libraries as powerful agents to assist in the instruction of the people, has been fully recognized by the Argentines. At present more than 200 of these Libraries are dispersed over the whole country, without exception due to private enterprize, increased in great part by the very pronounced protection which the General Government has granted to them. This last is also obliged by law, to contribute an equal sum to that which may be already subscribed to the foundation of New Libraries, or the increase of those already existing. A Central Commission exists at the residence of the Government, for the purpose of facilitating the acquisition of books for these Libraries, and to favor a more united direction: this step has proved extremely practical.

The most considerable of these Public Libraries is that of Buenos-Aires, which holds at present 30,000 volumes; at the end of 1872 it only contained 22,000, since when Dr. Vicente Quesada, its able, intelligent, and extremely zealous Director, has devoted

himself to its prosperity with the best success. It is passably rich in manuscripts concerning the earlier history of the Spanish Colonies, some of which are of great interest, and we hope will soon be printed, and thus be made more accessible to the public.

The library of the University of Buenos-Aires as also that of the older Institution in Córdoba, have, properly speaking, no scientific importance, although their archives contain some interesting manuscripts from which we have drawn our information concerning them. On the other hand, the National Library attached to the Department of Public Instruction, notwithstanding its recent origin, merits the greater attention on account of its preference shown in the service of our domestic history.

The first article of the Argentine Constitution orders the Federal Government to uphold the Roman-Catholic faith; *i.e.*, to contribute the expenses of its maintainance, whilst garanteeing perfect liberty of religion. For this reason and purpose a sum of about one quarter of a million of gold-dollars figures in the budget, which is hardly one quarter of one per cent. of its total. From this fact alone, it may be surmised that the clergy do not exercise any influence over the State; otherwise, this sum would certainly be much more considerable. An Archbishop, at present Sr. Federico Aneiros with his see in Buenos-Aires, is the head of the Argentine Church, whilst a Bishop resides in each of the cities of San Juan, Salta, Córdoba and Paraná. The Argentine Republic is therefore, divided into four dioceses, with one Archbishopric which also serves the diocese of Buenos-Aires. Congress takes part in the choice of the highest dignitaries of the Argentine Church; that is to say, the Senate elects a list of three persons, from which the Government chooses one to propose to the Pope. In general the Constitution is a sufficient safeguard for the interests of the State against the Church, and the latter is much more limited in its jurisdiction than in many of the States of Europe. Thanks to the law which guarantees the free and unobstructed exercise of every religion whatever, a proportionally large number of churches of other creeds exist. In the city of Buenos-Aires, as also in several other Provinces, the Anglican Church, the German Protestants, the American Methodists, and even some Israelites, possess Churches, and have officially-installed clergyman, whose functions in marriages, baptisms, etc. are fully respected. Schools are almost always joined to these Churches in which Religious Instruction, according their creeds, is freely given. As a proof that the Government is not only tolerant, but that it recognizes the equal rights of the different faiths, it suffices to say, that in all cases where a non-Catholic district be found too poor to

sustain its schools in a proper manner—as sometimes happens in some of the Agricultural Establishments—the Central Governments have always been disposed to grant them the necessary aid.

Finally, we will add some observations on the press. The liberty of the press is an old acquisition among us, although it is much less abused than in other States in the same condition. Extravagancies naturally take place here also, as certainly no one will imagine that our Press would keep itself within the limits prescribed in other countries by the Attorney General or the prejudices of shop-keepers. But it would be easy to prove that our journals are generally well-conducted in this respect, and sustain a good comparison with those of other countries where the same liberty is enjoyed.

Aside from the political newspapers—which abound particularly in the capital and of the largest size—there is also a number of scientific periodicals which naturally struggle here against many difficulties, but whose efforts on that very account are only the more meritorious. We also have newspapers in foreign languages; at present 2 in English, 4 in German, 1 French and two Italian. The foreigners, whose organs these newspapers are, also support Societies of charity and social enjoyment, which flourish alongside of similar establishments of the same kind, founded and sustained by Argentine citizens; for charity is a virtue fully generalized in this beautiful and wealthy country.

CHAPTER XXII.

ARMY AND NAVY.*

HARDLY 65 years have passed since the political emancipation of the country, and yet in so short a period in the life of a people, the young Republic has conquered an honorable and brilliant page in military history.

The invasions of the English in 1806-7 gave the first opportunity to the sons of this beautiful country to try their warlike qualities. The truly heroic defense of the city of Buenos-Aires, was one of the first glorious deeds which demonstrated what raw soldiers—but full of enthusiasm and patriotic feeling—are capable of doing even against regular and veteran armies.

The struggle which shortly after took place for the political independence of the country, again called all patriots to arms. The first Argentine banners were covered with imperishable laurels in numerous battles and bloody combats against the valiant and disciplined Spanish army, which was compelled to respect them even beyond the Cordilleras as far as the city of Lima itself.

Suipacha, Tucumán, Salta, Chacabuco, Maipú, are glorious memories never to be forgotten by Argentines; whilst Vilcapujo, Ayouma and Cancha-Rayada, are reminiscences of the inconstancy of the Goddess of Victory, who has never allowed herself to be captured by any one flag alone.

Among the many brilliant episodes of that laborious campaign, the most notable doubtless was the bold and dangerous march of Gen. San Martin across the Andes.

Hannibal and Napoleon crossed the Alps, and a great part of their fame is due to the amazement caused by those audacious marches; but San Martin, inspired by the genius of these heroes,

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* By Major F. L. Melchert.

and firmly decided to free his brethren on the other side of the Cordilleras, at the head of hardly 4000 men carrying only their indispensable arms and ammunition, crossed those imposing mountains which majestically display themselves in South America covered with eternal snow, and after 24 days of a march across these savage regions full of indescribable difficulties, he gained the brilliant victory of Chacabuco, over a Spanish army superior both in arms and men.

This glorious feat opened the doors of the Chilean capital to the Argentine General. "Only 24 days had been required to "pass the highest mountains in the world; terminate a campaign "and free Chile from its tyrants."

In the mean time Brown, with his extemporized squadron, seconded the operations by land in a brilliant manner. Thanks to an energy and tact only comparable to his personal valor, that brave sailor knew how to balance his numerical inferiority as well in vessels as in men, by contributing on his part and on his own element, to give days of glory to the young Argentine flag.

The glorious epoch of war against Brazil, was closed by Alvear at the brillant victory of Ituzaingo, which he gained over very superior numbers; then, almost simultaneously, the no-less-violent struggles of intestine parties commenced.

The frequent civil-wars in this country—as well as in other South American States—have often been mentioned as a reproach to us, by Europeans who doubtless have but incomplete information respecting the condition of this country. So far from this state of things being discreditable, it would be difficult for it to be otherwise unless the human race itself were changed, as it appears only natural that in a country recently emancipated and suddenly delivered to its own guidance, men of note and desirous of glory, who for the most part had distinguished themselves as soldiers in the war of Independence, should form parties among their personal adherents, and struggle to perpetuate themselves in power.

After long years of bitter experience, the best elements among the people came out of these bloody-struggles with victory.

Another national war broke out so lately as 1865, against the Dictator of Paraguay. Once again the Argentines honored their reputation as valiant and persevering soldiers in this campaign which lasted more than four years, and during which it was necessary not only to conquer a fanatical adversary who defended himself with unspeakable tenacity, but also the innumerable obstacles and natural difficulties of a tropical country; and all this we had to do alongside of an ally, who at the beginning of the campaign was entirely wanting in military experience, and who of all the South American nations is the slowest to acquire it.

It is perceived by this slight sketch of military events in the Republic, that from the first shock with the English to the present time, Argentine arms have hardly had a truce. Whether in international contests or in party-struggles, or in combats against the Indians, it is certain that occasions have not been wanting to the Argentines to use their arms; and when it be considered that the greater part of the soldiers are men habituated from infancy to the vicissitudes, and privations, and innumerable dangers of a frontier life, it is easily understood that the natives ought to be, as undoubtedly they are, excellent-soldiers, gifted with unsurpassed valor and self-denial.

These are the qualities constantly manifested by them, which have so greatly endeared the glorious deeds of their ancestors to every Argentine heart, and on which they rely in case of foreign war.

Although it is true that many deficiencies exist in regard to military instruction and organization, they are only the natural consequences of an almost uninterrupted activity in war. Nevertheless, much has been already recovered in this respect, and patriotic efforts are incessantly made to conclude the great edifice which with such solid foundations, cannot do otherwise than show itself proudly and remain immoveable, during any future tempest.

According to the laws of the country, every Argentine fit for military service belongs to the National Guard from 17 to 45 years of age, and this Guard when called into service, is equipped in all respects like the army of the line.

The President of the Republic is the commander in chief of all land and sea forces; he also appoints all the officers up to the rank of lieutenant-coronel included. The higher grades are appointed by him with the consent of the National Senate.

The land forces are composed of the army of the line and the National Guard. The naval forces are subdivided into the Navy proper, and a Marine National-Guard, as a contingent force in time of war.

The highest military authority is the Minister-Secretary of War and Navy, before whom all matters belonging to the Army and Navy are brought. He is charged with the general organization and administration; and from him emanate all orders, as well during peace, as in time of war.

Next under the Minister-Secretary of War and Navy is the Inspector General of the Army. This officer is the intermediate organ for all matters of the service, it being his duty to present them to the Minister for his decision.

In time of peace it is the duty of the army of the line to defend the frontiers from the depredations of the Indians, to gar-

rison distant and sparsely-settled points, and to maintain internal order: in time of war, its mission is to serve as a model and stimulus for the National Guard.

Its present force is as follows:—

1 Regiment of horse field-artillery, 400 men in 4 squadrons with eight batteries.
2 Companies of siege-artillery, 200 men.
11 Battalions of light-infantry, 400 „ each in 6 companies.
12 Regiments of light-cavalry, 400 „ „ in 4 squadrons.
1 Engineer-corps, at present forming.
1 Corps sappers-and-miners, at present forming, 100 men.
Various detached pickets at different places, 650 men.

The Provincial troops are:—

In Buenos-Aires, 1 battalion of light infantry, 500 men.
„ Santa-Fé, 1 „ „ „ 200 „
„ Entre-Rios, 1 „ „ „ 300 „

Nearly 300 tame Indians serve as irregular cavalry in the different frontier commands.

To these we add the staffs, and officers on leave, of which a part can be called into active service at any moment, whilst the remainder—in case of calling out the militia—fill the posts of command in it.

These officers receive full-pay, half-pay, or quarter-pay without extras according to the category to which they pertain, Such as belong to the passive staff have no pay, but keep their rank.

The total of the army of the line is as follows:—

	Generals.	Colonels.	Lieut.-colonels.	Majors.	Captains.	Aids-de-camp.	1st and 2d Lieuts.	Sub-lieuts. and ensigns.	Rank and file.
Staff	9	30	52	68	56	9	10	6	—
War-Department and subordinate offices	—	4	10	9	15	1	7	4	—
Artillery and special-corps	—	2	2	4	12	4	20	15	700
Infantry	—	4	9	11	66	22	132	77	5400
Cavalry	—	3	12	12	73	24	144	110	4800
Frontier-commands	—	—	25	8	20	12	42	26	—
Arsenals	—	—	2	3	—	—	—	—	—
Troops not enrolled	—	—	—	—	—	—	—	—	650
Irregular cavalry	—	—	—	—	—	—	—	—	3000
Total	9	43	112	115	242	72	355	238	14550

The National Guard is composed, as we have already said, of all the able-bodied males between 17 and 45 years of age, and

whether in war or peace, it is subdivided into infantry and artillery, according to the new organization actually in operation. Its officers are appointed by the Provincial Governments.

Such men as may be fit for service between 45 and 60 years of age, constitute the reserve.

The Marine National-Guard is recruited from the inhabitants of the coasts and islands, as also, from among the crews of the merchant-vessels.

Owing to the new organization of the National Guard, which is actually in progress in all the Provinces, exact data are wanting respecting its numerical force. Not to commit errors therefore, we will limit ourselves to the official figures of 1869. According to these, and keeping in mind the legal exemption, we have the following forces in round numbers in the 14 Provinces, which ought to be taken as the *minimum;* to wit:—

Provinces.	Active Nat. Guard.	Reserve.
Buenos-Aires....	45,000	25,000
Santa-Fé.....	16,000	3,500
Entre-Rios.....	20,000	5,000
Corrientes.....	17,000	5,000
Córdoba.....	30,000	7,000
San Luis.....	7,000	1,500
Santiago.....	23,000	5,000
Mendoza.....	9,000	2,500
San Juan.....	8,500	2,000
Rioja.....	7,000	1,500
Catamarca.....	14,000	2,500
Tucumán.....	18,000	3,000
Salta.....	15,000	3,000
Jujuí.....	6,500	1,500
Total....	236,000	68,000

It is perceived therefore that the gross strength of the Republic is found in its useful citizens, which have always exercised the functions of *regular-troops* in the full extent of the word, and rivalled the army of the line in courage and abnegation.

For this reason, the Argentine National Guard differs essentially from analogous institutions existing in Europe, it being rather more worthy of being compared to the *Landwehr* of Germany.

Only the recently-inscribed youths can be considered as recruits; the rest are perfectly familiarized with the rigors of military service, because they have been called out so often in both foreign and domestic wars. Moreover, whoever leaves the army of the line whether officer or soldier, is obliged to enter the Na-

tional Guard immediately, so that frequently a greater number of veterans may be found in its corps, than in those of the line.

It is with the most intimate conviction therefore, that we classify the National Guard of this country as able and veteran troops; and as such we can estimate the value of the above-mentioned figures.

Fortresses.— The Island of Martin-Garcia which commands the mouths of the Uruguay and Paraná rivers, is provided with permanent fortifications which are nearly concluded at present. Similar works will be made at the Arsenal of Zárate, for the defence of the squadron. Moreover, the greatest prevision has prepared the completest elements for the rapid arming of the shores and coasts with heavy-artillery and torpedos.

The frontier military-posts are only defended by light fortifications sufficient to resist any attacks from the Indians, and enable a small garrison to hold them.

Navy.— The navy of the Republic is undergoing reform, and the new organization is proceeding actively.

Although in all our previous wars small squadrons existed, they were almost always composed of merchant-vessels generally bad enough, which had been armed only for the war. Notwithstanding, even so, they rendered most important services and heroic assistance, especially in the war of Independence.

Our actual war-vessels are chiefly built and armed according to the most modern system, and their number in combination with the shore-batteries and torpedos is sufficient to advantageously defend the most exposed points against every attack.

The following are the war-vessels in the Navy at present:—

Number	Vessels.	Guns.	Tons.	Horse-power.
2	Iron-clads	12	3,400	1,500
6	Decked gun-boats	16	2,400	1,950
6	Large-steamers	30	2,500	2,520
6	Small „	20	1,200	500
3	Transports	—	1,500	600
2	Sailing-vessels	10	—	—
25		88	11,000	7,070

Moreover, the perfectly-organized torpedo Division has three vessels with 700 tons and 440 horse-power. The Navy is manned by 26 superior-officers, 48 subalterns, 43 midshipmen, 7 pay-masters, 40 engineers, 900 sub-employés and sailors, and 2000 marines and artillerymen.

In the different captaincies of Ports, on board hulks and light-ships and boats belonging to the Port-authorities—especially of Buenos-Aires—there is a considerable number of officers and sailors under service.

The Naval-School.— Under the direction of Argentine officers and proper professors, a naval-school is kept on board of the war steamer *General Brown*, where youths who have chosen the naval-career pass through a practical and theoretic course of 5 years-study. This institution is destined to be the true Normal-school for the officers of our Navy.

A new school for sailors is about to be founded—and in effect, the greatest interest is shown on all sides—to elevate the Navy to the hight of the most rigorous modern demands.

No distinction of rank exists between the officers of the Army and Navy; both hold their commissions from the National Government. The officers appointed during war as well those of the National Guard, are also commissioned in like manner, save that they rank next after the line.

Recruiting for the line is generally done by enlistment, for which purpose various offices are open, where those desirous of serving can be entered for a fixed term, never less than 4 years. Of the pay allowed, a part is given on enlistment, and the remainder on discharge.

When a sufficient number of men be not procured by this method, levies are raised, each Province being required to contribute a quota proportionate to its population.

Voluntary enlistment frequently occurs in the army of the line, and volunteers of good conduct and recognized ability, generally receive rapid promotion.

Military-School.— This institution, destined to the instruction of officers, has existed since 1869, and at present contains 75 pupils at Government expense, and 25 boarders. A sufficiency of elementary knowledge, age not less than 11 years, good health and robust *physique* are the conditions required to enter this school. The complete course lasts five years but the alumni who have distinguished themselves in their respective examinations during the three first years, are admitted as sub-lieutenants in the infantry and cavalry corps.

Those who finish the 5 years' course, can enter the artillery and engineering corps as officers.

No *Academy of superior military sciences* exists for the instruction of the officers. Therefore every studious officer must depend exclusively upon his own exertions for his advancement in knowledge.

At present, regimental and battalion schools for the instruction of the soldiers are projected.

Religious military-service is confided to ecclesiastics who accompany the army in campaign, under the rank of colonels and lieut.-colonels.

The *medical*-corps in time of peace is composed of the doctors, surgeons and other employés, belonging to the military hospitals in the cities and frontier garrisons. In case of war, special field-hospitals are organized, and the medical and sanitary corps increased.

A counsellor-of-war, who is a lawyer, is placed at the head of the Administration of Military-Justice. A permanent Attorney-General or *fiscal*, constitutes the Courts-Martial as follows:

For the trial of officers the Court must be composed of Generals and Colonels, but when sergeants or corporals are to be tried, it is composed of Captains presided by a superior officer.

The sentences rendered require the confirmation of the President of the Republic before execution. It is exclusively his attribute to commute sentence, or to pardon.

Summary punishment is only permitted in campaign, and in very special and determinate cases.

For military faults committed by soldiers, the punishments are imprisonment, additional service and death by shooting, according to the gravity of the case. For officers, they are arrest, degradation, expulsion from the service, and death with or without degradation.

Judicial proceedings are exactly the same for the National Guard when called-out, as for the army of the line.

A Committee, composed of competent military men and lawyers, has been named by the Government to draft a new penal military Code.

Until now, military justice is based upon the old Spanish laws and ordinances, which do not correspond to our age, and yet less to the condition of this country.

The disciplinary punishments are the same as those generally used in regular armies. Corporal punishment, formerly permitted in some European armies, was also in vogue here. But it was rigorously prohibited some years ago.

The economical administration of the army is under the charge of the Commissary-General of War and Navy, attached to the Department, and assisted by some subaltern officers especially occupied with the auditing.

The troops are rationed by private purveyors who make contracts with the Government for determinate periods. The purchase of horses for remounts of cavalry and artillery, is made in the same manner.

The pay of both officers and soldiers is in charge of the paymasters. At far distant places it often happens—owing to want of

communication—that the payments are not made with punctuality; therefore, the pay-masters generally pay several months at once, when they go to these far-off places.

One of the most important departments of the War Commissariat is found in the shops and deposits of uniforms, equipment and other goods, required for the Army and Navy.

The purchase of these articles is generally made by public competition, the most advantageous proposal being accepted under guarantee. Some articles are occasionally bought directly.

There are also special work-shops charged with the making of uniforms and under-clothing, which furnish work to thousands of poor families.

The general estimates of the War-Department including the Navy for the year 1876, amount to $ 6,000,000.

When the National Guard is called-out the legislatures immediately vote the extraordinary funds required.

The troops barrack in the cities, in public as well as in private edifices, which latter are hired for the purpose. Their barracks and other necessary buildings on the frontiers are made by the soldiers themselves, out of such materials as may be at hand.

On marches and rapid frontier-expeditions the troops generally encamp in the open air; in regular campaign and when they remain for some time in the same place, they use tents, or huts constructed of the materials on the spot.

Pensions.— The family of every soldier killed on the field of battle, receives a pension equal to half-pay of his rank. So in case of being invalided in active service, the pension is two-thirds of his pay, and full-pay in case of being completely disabled.

45 years of service—among which the time passed in campaign or on the frontiers counts double—give a right to a pension.

Armament.— In view of the improvements in fire-arms, the Argentine Government lost no time in procuring modern artillery and muskets for its army.

After competitive trials and studies of different systems of modern arms of precision, the Remington-rifle was decided to be the best for our army, and therefore, it was definitely adopted in 1873; the 12 cavalry-regiments were provided at the same time with carbines of the same system. Three years practical use have demonstrated, that the choice of the simple and solid Remington with metal cartridges, could not have been more correct. The infantry of the National Guard use the same arm.

Krupps field-guns are used in the artillery, and there are some *Gatling* batteries also.

The siege-artillery is composed of large and improved *Rodman* and *Armstrong* guns, from 20 to 25 tons weight and muzzle-loaders.

The war-vessels carry *Vavasseur* guns. The arsenal and the principal deposits of arms and powder, are in the city of Buenos-Aires. In the first, the metal cartridges for small arms and munitions for the field-artillery are manufactured, and all needful repairs made.

The foundery and pyrotechnic shops are special departments of this establishment.

All powder as yet comes from abroad, but it is hoped that it will soon be made here.

The Navy has an arsenal near the town of Zárate situated on the Paraná de las Palmas, or southern branch of the Paraná river.

We are sorry that want of space has compelled us to this rapid and incomplete sketch. Nevertheless, we hope that it is sufficient to give some idea of the military condition of the country. The Department of War and Navy is at present in the hands of an active and progressive Minister, who makes the greatest efforts to elevate both branches to the level of similar institutions in the most advanced nations.

To be enabled to complete this interior organization, and above all to solve the question of the frontiers, by putting an end to the depredations of the Indians, we ardently desire to see the Republic free from foreign complications; yet, should the fatality occur that our country be provoked to a foreign-war, we hold the intimate conviction that it will know how—as ever before—to oppose with strength and unity, any enemy whatever, and cover itself with new laurels.

CHAPTER XXIII.

INDIANS AND FRONTIERS. *

The Indians of Patagonia.

The Indian population of Patagonia, which is a National Territory of about 8000 square geographical-leagues, generally holds friendly relations with the civilized establishments on some points of the Coast and in the Interior.

Whenever the projected enterprises to people this region are carried out on a great scale, it is hoped that advantage will be taken of this favorable circumstance to gradually attract to civilization these indigenes who now lead a wandering life.

The entire Indian population of Patagonia and Tierra del Fuego, is calculated at 25,000 persons divided into numerous tribes.

These hords of horsemen are principally maintained by hunting, an occupation which forces them to continual wanderings, and frequently causes hot-disputes, which often end in bloody-combats between entire tribes.

The inhabitants of Tierra del Fuego live almost exclusively on fish. They hold a barter-trade with the Indians of the Continent, and for that purpose, frequently cross the Straits of Magellan in their fragile canoes.

The *Tehuel-ches* form the most important tribe of the Patagonians: their villages are situated between the Chubut and Santa-Cruz rivers, but they often visit the town of Cármen de Patagonés, which is near the mouth of the river Negro, and the residence of the National Military authorities, whose allies they have been for some time past, by virtue of a formal treaty of peace and amity.

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The *Che-he-ches* and the *Molu-ches*, which inhabit the interior Northern part of Patagonia from preference, are two other tribes of considerable importance.

The *Payu-ches* and the *Tamí-ches*, are found on the Eastern water-shed of the Cordilleras near the head of the Chubut river, to the Southward of the lake *Nahuel-huapi;* whilst the Southern part of Patagonia down to the Straits of Magellan, is the hunting ground of the *Pilma-ches*, *Yacanah-ches* and *Chehuel-ches*, Indians.

So far as regards language, character and customs, these tribes are hardly to be distinguished one from the other, and by the exercise of a little good will, as well as an upright yet firm dealing, it would not be difficult for the immigrants who establish themselves in Patagonia, to maintain friendly relations with them, and induce them by a good example, to adopt a less rude life.

The garrison of the town of Cármen has been reduced to 150 men owing to the pacific relations which exist with these Patagonian Indians, and this small detachment is sufficient to keep them respectful and obedient to the National flag.

The already numerous establishments on the fertile margins of the river Negro, have rather more reason to fear hostilities from the Pampa Indians than from the Patagonians, although owing to the increase of population there during the latter years, the attempts at pillage by the indigenes have become of the rarest; so much so, that at present the shores of the river Negro, whose lands are admirably adapted to agricultural establishments, may be considered entirely free from such disasters.

The Pampa Indians.

That vast plain called the pampa—of about 6000 square geographical-leagues comprised between the Cordilleras and the river Negro, and the Southern and Western frontiers of the Provinces of Mendoza, San Luis, Córdoba and Buenos-Aires—contains an Indian population of about 24,000 persons, a considerable part of which is already submitted to the National Government, and is performing military service in various sections of the frontiers.

The principal leaders of the still independent tribes continually celebrate negotiations of peace with the Government, but their people nevertheless, periodically make raids to pillage the pastoral establishments situated the nearest to the frontier.

According to the different regions of the pampa where the Indians are accustomed to live, they may be divided into four principal groups.

The first composed of *Puel-ches* under the command of the cacique *Namun-curá*, inhabits the territory which extends from Sa-

linas-Grandes—and rather more to the North—to the West near to the Colorado river.

Its forces, including the allied tribes of *Catriel* and *Cañumil*, do not exceed 3000 men, but they are increased during the spring and autumn months by the addition of the Araucanian Indians of Chile, who are accustomed to come from the Western slopes of the Cordilleras to visit them. Friendship and rapacity, induce these guests to take an active part in the invasions of the rich frontier districts of the Province of Buenos-Aires.

The *Ranquel-ches* under the orders of their cacique *Rosas*, count about 1000 warriors, and live towards the North of the outlets of the river *Chalileu*—or Salado—known under the name of *Urre-Lauquen* even beyond Lebucó.

San Luis and Córdoba were formerly the scenes of their thieving exploits, but due to the treaties of peace lately celebrated, they have almost completely ceased robbery, and it may be hoped that they will soon be completely dominated.

The *Pehuen-ches* are found on the South of the Province of Mendoza between the slopes of the Cordilleras and the river Chalileu; their forces may reach 1,200 men. The invasions of this tribe to the Province of Mendoza, are also daily more rare.

In addition to these three groups, there are some 300 Indians of different tribes who recognize *Pinzen* as chief, and lose no occasion to pillage the frontiers of Buenos-Aires. Of recent formation this tribe has chosen its residence between the *Puel-ches* and the *Ranquel-ches*, in a territory marked on the map by the dunes of *Choique-ló* and *Laughe-ló*.

In each one of the above-mentioned tribes—especially in that of *Pinzen*—a number of Christians are found who have fled from justice.

At first sight it would appear inexplicable to many readers, that the regular troops have not succeeded—if not in entirely subjugating at least—in driving afar and for ever, these gangs of barbarians insignificant in number, and whose arms are limited in general to the lance, the knife, and a species of sling called *bola perdida*.

But he who may consider this question more attentively will be convinced without doubt, that the complete submission of the savages of the pampa is not only immensely difficult, but that by the system of frontier defence employed until the present, almost all the advantages are on the side of the Indian.

In the first place the wastes favor him, as no one knows these better than he does, or at the same time knows how to derive greater advantages from them due to his astuteness and peculiar strategy. Thanks to the immensity of these uncultivated plains, their groups of horsemen almost always succeed in approaching the frontier lines unperceived.

Here a new advantage comes to their aid from the rapidity of their movements, whether for aggression or flight, in case their proximity be discovered.

Thus their appearance is almost always a *surprise;* and thus there is another advantage of which they rapidly profit, by sacking and fleeing with the booty, the only object of their incursions.

The Indian in general, knows how to make the expeditions against his villages equally fruitless. Even here his great ally the *desierto*, seconds him in a powerful way.

The savage never crosses it without fixing his penetrating and experienced sight upon the most insignificant object and the smallest suspicious indication, stopping upon every elevation of the soil, from whence he can recognize a single horseman who might appear on the distant horizon of this infinite grass-bed.

Thus it is that the expeditions which penetrate the pampa are discovered from the distance of many leagues, which leaves the Indians plenty of time to take refuge with their families and trifling effects, in far off hiding-places, leaving only their miserable empty huts to their enemies.

On their return however, the troops may be sure that the Indians who observe them from afar, will not cease to molest and attack them by all imaginable means.

To this end they will set fire to the grass, or attempt to stampede the horses during the night; in fine, they will do all possible things—if nothing more—to keep their adversaries in constant alarm.

The considerable distances, often of some leagues, which separate the different villages—which in general are only inhabited by a single family—also contribute to render nugatory all attempts to surprise the Indians of the pampa; thus it happens that should the nearest habitations be attacked, it is always possible for the majority of the tribe to escape death or capture, thanks to the astonishing rapidity of their flight.

These most especial conditions being explained, it is easy to comprehend why the complete submission of the pampa-Indians remains as yet an unresolved problem.

The defence of the frontiers.— The present military frontier of the Provinces of Mendoza, San Luis, Córdoba and Buenos-Aires, commences at the foot of the Cordilleras on the side of the pampa, and forms a broken line of 300 leagues in extent to the place, where the road which leads from Bahia-Blanca to Patagonia, crosses the river Colorado.

This colossal front is subdivided into nine distinct sections, each one of which is in charge of a commander who is always a superior officer, under the immediate orders of the Department of War.

The chief of each one of these sections keeps the greatest part of his forces concentrated within intrenchments established at proper points, generally in the centre of his line. The flanks of the extensive front are covered by posts of observation, also fortified from distance to distance, at intervals of two to six leagues.

These military stock-houses have small garrisons under the command of subaltern officers, and all have a cannon for signals.

The interior lines of communication are organized in the same manner.

The most important of these stock-houses on the line of defense are garrisoned with more numerous detachments.

Every morning at day-light, and sometimes also at evening, the intermediate ground is inspected, as also sometimes on the front. If sure signs have been discovered on the soil that the line has been passed—and the numerical importance of the invaders can almost always be known from the tracks of the horses—the cannon give the alarm from stock-house to stock-house, to the commander-in-chief and the neighboring sections.

The pickets stationed in the posts of observation, generally too weak to take the offensive against troops of Indians of some consideration, remain at their posts on the defensive, whilst the troops which are with the commander attempts to find and defeat them; or else with the same object in view they are placed at determinate sites, where it is known by experience the Indians must pass on their return.

In all these preparations and dispositions—which as a general rule are executed with the greatest precision and all possible celerity—some hours have been spent of course, which the Indian has utilized by reaching the nearest *estancias*, herding the cattle, and driving them off.

Fortunately, the withdrawal of the herd compels him to a slower march, which generally permits the troops to hunt down the robbers; rescue the greater part of the booty; and pursue them with more or less bloody results, to the interior of the pampa.

Nothing more than this can be done even by the most rigorous vigilance, so long as the actual system of the defense of the frontiers exists.

If there were great natural obstacles in the pampa, such as rivers or mountainous ridges with certain and difficult passes, etc. it would be easy to give complete security to the frontier-districts; but these elements of defense only exist on the left wing of the front—frontier of Bahia-Blanca and the South-coast—and in part in the Provinces of Córdoba, San Luis and Mendoza, river Quinto, Atuel and Diamante. All the rest of the line is in the open and endless pampa, and the well-mounted hordes of the Indians will always be successful in breaking it without great danger.

The system has been adopted of establishing reserve posts for the protection and support of those points of the line which have large depopulated districts in the rear, and are therefore, complete wastes, so that some sections have a second interior line.

But the distance between the two lines is too great to be able to rely upon a simultaneous combination of operations in cases of great invasions.

The actual system of defense—if indeed, more complete now than years ago—is nevertheless, insufficient as yet, and whilst it exists it will be difficult to put an end to the depredations of the Indians, no matter how much intelligence and activity the frontier-chiefs may display.

This is the conviction of all who know the transcendental importance of this question.

It is now some time since the principal military authorities are planing a reform of the frontier defense, by giving to it a more adequate organization, so that the few thousands of pampa-Indians may be completely subdued. But our continual intestine and foreign wars reclaimed all the attention of those who desired this change, and thus it is, that not being able to pay proper attention to the question *frontiers*, nothing has been attempted save to diminish as far as possible, the defects of the existing system.

The present Minister-Secretary of War, gives all his care and earnest desire to this question, and appears to be firmly decided shortly to put in practice a plan already matured, which promises the best results.

Probably the lines of defense will be kept at points determined by nature, above all on the shores of the rivers and streams, and a new front of much less extent will be established, by endeavoring to occupy those places which like Carü-hué, for example, Laguna del Monte, and other admirable localities for the quality of their pastures and permanent waters, possess those special natural conditions which are indispensable to the Indian for the preservation of his horses.

If as may be expected, the positions where they keep the horse —the principal element for their raids on the frontier settlements— can be taken from them in the first months of 1876, they will have no other resource save to penetrate farther into the Pampa in search of other localities favored by nature in the same way; or, as is most probable, they will finally prefer to follow the example of many of their companions, and submit to the Government.

Among the preparations which are already remarked for proximate operations, we must mention the construction of telegraphic lines to the principal sections of the frontier; these works will soon be terminated.

Telegraphic communication between the War-Department and the commander of the distant frontiers, was an urgent necessity for the immediate receipt of news, as well as for the rapid transmission of orders.

It is also probable that a number of friendly Indians will take part in these military operations.

The tribe of the cacique *Coliqueo* which is stationed between the towns of Junin and Bragado, and the block-house *Triunfo*, is the most important among these, and can give a force of more than 600 lances.

Other groups of tame-Indians—some 120 armed men—each under their captains, live in the neighborhood of several of the frontier-garrisons, and are in permanent active-service.

The Gran-Chaco Indians.

The defense of the frontiers of the Provinces of Santa-Fé, Córdoba, Santiago and Salta, against the attacks of the Indians which inhabit the Gran-Chaco, also requires a considerable part of the army of the line to be stationed there.

The general aspect of those lands forms a complete contrast with that of the pampa. Instead of the open-plain in the full extension of the word, we now reach majestic, and often impenetrable, forests, which cover many square-leagues, and where the want of water is almost absolute.

Other not less extensive regions, generally covered with numerous palm-groves, are constantly inundated during many months, and almost impassable during the raining-season.

These periodical inundations reach greater proportions on the generally flat-shores of the rivers which cross the Chaco; they are the Salado, the Vermejo and the Pilcomayo, and places are rarely found on their banks free from these freshets.

All the right-margin of the Paraná and Paraguay rivers is in the same condition, so that very few points on the banks of these rivers can be occupied in future, for the establishment of new settlements or permanent abodes.

For the rest, the territory of the Chaco is favored by a benign and healthy climate; it is extraordinarily fertile, and most rich in timber for building and manufacturing purposes. Therefore, it is admirably fitted for agricultural and pastoral purposes, and especially for the explotation of its valuable woods.

These conditions of the Chaco, diametrically opposed to those of the uncultivated and sterile pampa, could not do otherwise than influence the character of its inhabitants. Therefore, instead of the indomitable and tireless savage-horseman of Patagonia and the pampa, we find in these districts a numberless quantity of small

tribes, often consisting of only a few families, which build their miserable huts of straw, now, on the shores of the rivers, again, in the interior of the forests, according as they are occupied for the purposes of subsistence in hunting, fishing, or harvesting the various wild-fruits of the woods.

The resistence which these tribes have manifested to submit themselves, since they have been in contact with civilized people has always been small, and thus it is, that a great part of the 45,000 persons estimated as the Indian population of the Chaco, is already found in pacific and even friendly relations with the squatters, and the inhabitants of the neighboring Provinces.

Notwithstanding this, the mode of life, manners and customs of these children of Nature, have been modified but little: it might be said that in nothing has it been changed since the Spaniards discovered these lands.

It is some considerable time since the forests opposite to Corrientes have been regularly exploited. Many Indians are found there who live in the best harmony with the lumbermen of those numerous establishments. They belong to the tribes of the *Chunipies, Vibelas* and *Tobas,* and maintain quite-active commercial relations with the left-bank of the Paraná; above all, with the city of Corrientes.

Their fragile canoes continually cross the impetuous torrent, loaded with hides, wax, feathers, live-animals, and even forrage, for sale, or exchange for other articles required by them.

At the fruit-harvest hundreds of these singular copper-colored and almost naked journeymen, are occupied in the orange and lemon-orchards in picking the fruit. They also undertake various labors in the *saladeros,* or jerk-beef establishments.

The same occurs in the villages of Empedrado, Bella-Vista, and the town of Goya, situated down-stream on the margin of the same river.

But the Indian element has most developed itself in the Provinces of Jujuí and Salta.

Some years have passed since the *Chiriguanos* established their permanent residence there. This tribe is essentially different from the other tribes of the Chaco. It is the most civilized and is composed of laboring and able-men, whose exterior appearance is sufficient to make an agreeable impression, by its surprizing contrast with that of their neighbors, the filthy and naked *Matacos.*

In the plantations of Campo-Santo, San Isidro, Ledesma and others, the harvest of sugar-cane is almost exclusively gathered by the *Matacos.* Without their cheap assistance, the proprietors of the plantations and the sugar manufacturers, would certainly obtain less flattering results. As soon as the harvest is over, the families of these Indians return to their distant forests, often 120 leagues

afar, to pass there the rest of the year in their accustomed mode of life.

There are other tribes of *Matacos* which dwell in the environs of Rivadavia, upon the Vermejo, and of the military stations, who are not only completely tamed, but for the most part possess fixed abodes and dedicate themselves regularly to labor of different kinds. The tribe of the old cacique *Granadero*, excels among all these, on account of its faithful friendship for the Christian settlements on the frontier of Salta.

Let us glance now at that part of the Chaco which bounds on the river Salado and the Province of Santa-Fé. Here we will also find a considerable number of *montaraces* or wild-mountaineers, entirely tamed, and others—as for example the remains of the once important tribe of the *Abipones*—who have long since abandoned a nomadic life, and finally established themselves near the numerous agricultural settlements of that Province.

The *Tobas, Mocovies* or *montaraces* who occupy the Central-Chaco, are the only ones who are accustomed to leave their lairs from time to time to assault the cattle and agricultural establishments, or the huts of the neighboring lumbermen.

The first of the above-mentioned tribes is very numerous, and dwells in the Central-Chaco from the right margin of the Vermejo, to beyond the Pilcomayo. The Tobas always attack the invaders of their dominions, and are altogether the most warlike and brave of all tribes of the Chaco; the others fear and shun them with reason. During the frequent bloody struggles among the various tribes, the Tobas have always proved their superiority. Already many of them have fire-arms which they manage with skill, and moreover, like all the Chaco-Indians they are excellent archers, and also use a short-lance and a club made from wood as hard as iron.

The majority of these Indians have no horses, and their marches and excursions whether for war or the hunt, are made on foot. It should not be forgotten that rapid movements on horse-back, are almost impossible amidst these thick forests, and even the intermediate fields are covered with herbage which exceeds the hight of a man. Thus the horse and mule can only serve in the Chaco as a convenient means of slow transport, but not for war purposes; and therefore, the Indian there, although he loses no occasion to possess these animals by fair or by foul means, rarely becomes a good-horseman.

The troops which are stationed in the Chaco for the defense of the frontiers of Santa-Fé, Córdoba and Santiago, occupy a straight line drawn from the mouth of the *Rey* stream, due West to the Salado river. The line then follows this river until it passes the Bracho. The whole line is divided into three principal sections, which

are defended as in the pampa, by large and small fortified-posts. Small detachments are conveniently stationed in the rear of the principal line for the security of the immigrant settlements.

The National Government also maintains a military division in the frontier-departments of the Provinces of Salta and Jujuí, as a guarantee against any assaults of the Indians which dwell between the Pilcomayo and Vermejo rivers.

The commander of this distant and isolated section resides in the town of Dragones; and, under the immediate superintendence of this central establishment, permanent advance-guards are kept towards the Pilcomayo, at the ford of the Vermejo and its confluents the Teuco and Yegua-Quebrada, as well as at other important points.

In combination with frequent expeditions and explorations, these measures have been crowned with success, inasmuch as they have finally driven back all the hostile Indians, and compelled them to take refuge in the depths of their forests. The complete security of that frontier is, therefore, a fixed fact.

The preceding information about the Indians of the Chaco serves to demonstrate, that by founding some agricultural settlements of average importance, but properly distributed in chosen places, the submission without exception of all the indigenes could be accomplished; and at the same time they would be converted into useful and cheap laborers.

We would recommend the margins of the Vermejo, as the fittest field for the realization of this idea; they are extraordinarily fertile owing to the periodical inundations. We ought also to mention that steam-navigation has been established in the river.

The soil could not be better for the cultivation of cotton—which grows wild in the Chaco—for sugar-cane, rice, tobacco and many other beneficial plants. The immigrants would find moreover, inexhaustible wealth in the most varied classes of indigenous woods. In short, the future which awaits those who may settle in those regions, is brilliant under all aspects.

Finally, it is also to be hoped that the Government will restore the old cart-road which ran along the Vermejo, and led from the Paraná in front of Corrientes, to Rivadavia, and from thence to Salta, Jujuí and Bolivia; then a considerable exportation of cattle for Bolivia would take place by this shorter road.

Should this course—long since projected—be taken, the agricultural settlements near the Vermejo will enjoy the immense advantage of two means of communication.

Explanation of the chart of the pampa.

A great part of the pampa is very little known as yet.

The construction of more exact charts and maps of this territory, is therefore, reserved for a future time.

The rapidity of the military expeditions hitherto undertaken to the interior of the pampa, has not left time to make observations and detailed studies.

In these hurried marches it has only been possible to take some good sketches of the general aspect of the land, determine more or less correctly the geographical position of some points, and approximately establish distances and reciprocal relations between the rest.

Our knowledge of that part of the pampa which is inhabited by the wild-Indians, is generally based upon verbal accounts of the tame-Indians, or other persons but little enlightened, who have spent some time in those regions either as prisoners or otherwise.

Such data, as may be naturally supposed, are wanting in exactitude and largely induce errors especially in judging of distances.

From the reports of the *vaqueanos—ang.* guides or pilots—these are generally too long, whilst the Indians on the contrary always estimate them too short.

Moreover, there is little uniformity in the names of places, from which much confusion arises.

Buenos-Aires is the only Province where formal surveys of the frontier-districts—or near to them—have been made.

The *Registro gráfico* of that Province, and the studies latterly made to locate some railways which approach the frontier, were the only serious works in existence which could serve as a basis for those afterwards practised on the line of defense.

The plans of the present cordon of military posts—and contiguous lands—were made by ourselves and the military engineer Wysovksi, in the years 1871-2, under order from the Minister-Secretary of War; and a commission on duty a short time ago in the same regions, enabled us to rectify a great part of those plans, as also to determine the position of many military posts established since then; so that the line of frontier determined in our map may be considered as exact.

The tracks from the forts "San Martin" upon the Sauce-corto stream, and "Lavalle" upon the Sanquilcó, to Caru-hué, Pudan, and beyond Salinas-Grandes, are marked according to data furnished by the military expeditions, and above all, according to the descriptions of the missionary Salvaire an intelligent and educated man, who has just visited the Indians of Salinas, where he even entered the hut of the cacique *Namun-curá*, on the shores of lake *Chil-hué*.

We have had no other basis for the description of that part of the

Pampa comprehended between fort San Cárlos, Laguna del Monte —*Guamini*—and Salinas, than the narrative of the expedition made in 1810 by Col. Garcia, which started from the "Guardia Lujan," to-day, the city of Mercedes where there is a railway-station.

Observations posterior to the notes taken during that expedition, have demonstrated however, that these were erroneous in the calculations of longitudes, which were too far to the West. These mistakes have been rectified in our map as far as possible.

Until a few years ago, the land which lies to the West of fort Paz was *totally* unknown, when Col. Lagos undertook a flying expedition as far as the villages of the Pinzon Indians. By order of the Secretary of War we accompanied that expedition for the purpose of making plans.

This district of the pampa appears according to said plans, which have since been amplified by new explorations of Col. Lagos in that neighborhood.

The representation of the territory comprehended between the river Cuarto and Melincué, and between river Quinto and fort Gainza—as also the continuation of the land towards the S.W.—belongs also to our own observations, or else is based upon the studies of the ex-commander of that frontier-section Col. Mansilla, who penetrated to the villages of the cacique *Rosas*.

The greater part of the nomenclature of the different points in those regions, is copied from that commander. There are other places, as, for instance, between Loreto stock-house on the old line and the present fort Gainza, which were named by us, during expeditions we commanded by order of our chief, who at that time was the same Col. Mansilla.

Neither before nor since, have there been any other studies made upon that part of the pampa, although Maj. Wysocki ran over the frontier taking plans of it, as well as of the forts and stock-houses in 1872.

The representation of the territory from Mercedes on the river Quinto, to that occupied by the *Ranquel-ches*, is based upon the official data of the latest military expeditions, which penetrated to Guaná, near the river Salado.

In the remaining parts of the pampa, no scientific labors have been undertaken up to the present time, therefore, they are only known by very deficient descriptions, especially the territory situated between the rivers Colorado and Negro, and that inhabited by the *Pehuen-ches* between the river Salado and the Cordilleras.

To determine our sketch of these regions we have had before us the track of Luis de la Cruz from Chile, across the pampa to Melincué.

Avendaño, who lived as a prisoner for nine years among the *Ranquel-ches*, gives very interesting and detailed information about

those districts. The manuscripts of those descriptions are now in our possession; they have never been published, and have furnished us with much material.

Very little is known as yet, about the true course of the Atuel, and Chadí-Leubú or Salado, rivers, as also respecting the outspread of the last, under the name of Urre-Lauquen into an immense lagune covered with reeds and plants called *Totora*, probably similar to the *Amarga* in which the river Quinto and the Santa Catalina stream disembogue.

In the preceding lines we have made mention of the principal sources from whence we have taken our map. But in view of the projected advance of the frontiers within a few months, new reconnoissances and explorations will be made, so that ere long we will possess more exact knowledge about the pampa, which is of so much importance to pastoral and agricultural industry.

CHAPTER XXIV.

IMMIGRATION AND AGRICULTURAL COMMUNITIES.

SINCE the year 1857, when statistics among us commenced to be somewhat more exact, the total immigration by sea to the Argentine Republic, amounts to 449,353 persons. To wit:

1857.....	4931	1867.....	17046
1858.....	4638	1868.....	29234
1859.....	4735	1869.....	37934
1860.....	5656	1870.....	39967
1861.....	6301	1871.....	20930
1862.....	6716	1872.....	37037
1863.....	10408	1873.....	76832
1864.....	11682	1874.....	68277
1865.....	11767	1875.....	42066
1866.....	13696		

Since the year 1870 the statistics have been more detailed, and we have taken from them the following table:—

Nationalities.	1870	1871	1872	1873	1874	1875	1870-75
Italians	14045	8170	14769	26278	23904	9130	96296
Spaniards	3388	2554	4411	9185	8272	4036	31848
French	2396	1988	4602	7431	5654	2633	24704
English	453	694	968	1588	1036	1288	6027
Swiss	499	435	623	1649	679	376	4261
Germans	148	155	269	796	39[illegible]	354	2114
Portuguese	119	157	151	210	213	107	957
Austrians	67	50	62	127	156	93	555
Belgians	27	22	38	136	48	38	309
All others	2941	396	315	982	320	477	5431
Disembarked here	24803	14621	26208	48382	40674	1852	172500
Via Monte-Video	15884	6309	10829	27950	27903	23534	112109
Total....	39967	20930	37037	76332	68277	42066	284609

As we have said, only immigrants from beyond sea are included in this summary, for they compose the forward or third-class passengers; those who come by land from neighboring countries—such as Chile and Bolivia—and who are quite numerous in the Andine Provinces, are not comprehended in this table.

These statistics are very faulty in general, inasmuch as we have no such institution in our port, as "Castle-Garden" of New York, and therefore, the preparation of an exact register of immigration has been—if not impossible, at least—accompanied by difficulties sometimes insuperable.

As yet these data on immigration depend almost exclusively upon the declarations of the sea-captains. If on the one hand, a large number are improperly included among the immigrants *via* Monte-Video, which are not so in reality in view of the active interchange of passengers between that city and Buenos-Aires, on the other, is it undoubted that the number of immigrants which come directly to Buenos-Aires is greater than the lists indicate. Moreover, it is to be observed in reference to the immigration via Monte-Video, that many vessels with immigrants from European ports bound to the Argentine Republic, do not touch at any of our ports, but disembark their passengers destined to us at Monte-Video. This occurs with all the Pacific steamers —above all with those of the Liverpool-Callao line, which—formerly four, and now two, per month—always bring some hundreds of immigrants for Buenos-Aires, principally from France, Spain and Italy.

Inasmuch as the immigrants which come to us *via* Monte-Video—among whom are found however, quite a number of former immigrants to Brazil—are not classified by nationalities, our table is defective in this respect; it only shows the nationality of those who disembark directly from sea. It is demonstrated therefore, that the Argentine Republic in respect to annual immigration, is only exceeded by the United States of North America, a fact which might lead to the supposition that an energetic propaganda is made abroad in favor of emigration to this country, based upon its specially favorable legislation *ad hoc*. But this supposition would be entirely erroneous, inasmuch as, although the Goverment maintains a certain number of well-paid immigration agents in Europe, charged to attract the attention of voluntary emigrants to the advantages which these regions offer to them, as yet the activity of these agents has been of so little effect, that of each hundred immigrants who disembark in Buenos-Aires, probably not ten have had any knowledge of these personages.

The Argentine Government suspended all these agents in the beginning of 1876; it is difficult to determine whether permanently, or only as a preliminary step to the organization of a new system

of propaganda, the urgent necessity for which is more apparent day by day.

The legislation of the country is also very defective on the score of the settlement of the immigrants; for no part of the great extent of the Public Lands fit for population has been even surveyed, and it has been necessary to pass a special law each time that it was expedient to found a settlement. It is just to observe at the same time, that whenever such a case was presented, the Government as also the Legislature, were always generous, but this could not prevent the proceedings in this class of enterprises from being prolonged in a most discouraging manner; above all to spontaneous immigration which is now completely paralized. Thus the immigrants are almost always obliged to enter into relations with private speculators, which produces results more or less prejudicial to them.

The present administration understands that one of its most important tasks is the reform of the present system of immigrant-settlements, and it presented to the Congress of 1875 an extensive bill on the subject which passed in the Chamber of Deputies, and will undoubtedly be accepted this year by the Senate; although probably, with some more-or-less essential modifications.

But if, certain as it is, previous legislation on this matter has even defective, on the other hand it can be declared, that in no other country is the newly-arrived received with so much solicitude and care as among us. A central Department of Immigration exists in the city of Buenos-Aires for his accommodation, which was at first, administered by a commission of citizens and a salaried secretary, but is now converted into a General Commission.

To this Central Department belong:

1st, The Commission and Sub-commissions of Immigration established in all the Provincial capitals and other important points of settlement.

2nd, A Central Intelligence office.

3rd, An Asylum or Hotel, for Immigrants where such of the newly arrived as desire it, are fed and lodged gratis during a few days after arrival. Even the disembarkation, which the absence of a port in Buenos-Aires makes very costly—for large vessels are compelled to anchor in an open roadstead several miles from shore—can be made without any expense to the immigrant. The landing officer, an employé of the Department, immediately goes on board of the immigrant-vessels and gives a ticket to each one who ask for a free-passage for it himself and luggage, on board of the small steamers which ply in the roads for that purpose.

The immigrant can go where he pleases on landing, but it is his interest to go to the Asylum, where, as we have already said,

he receives without charge lodging and abundant and healthy food during some eight days. The newly-arrived is always his own master, a fact to which we give great weight. He can leave the Asylum when he pleases some hours after his arrival, or wait there for eight days; he has also another advantage—which all can make use of without any other formality than a simple request, *i.e.* to be transported to any other place in the country at the expense of the Government. The Commissary of Immigration assists him and counsels him on the choice of the best direction for him to take, an especial duty of the Intelligence Office, which is nevertheless, limited to simple explanations and officious advice, which ought not to influence in any wise the free will of the immigrant, whose liberty of action is always guarantied.

Inasmuch similar advantages are offered to the immigrant as in other countries—although less extensive and under charge of repayment, without which they do not receive them—it is proper to repeat, that all the advances which we have just enumerated and which the immigrant to the Argentine Republic enjoys, are without any conditions of retribution; the landing is gratis, as also his reception and support; the steps taken to procure him labor according to his aptitudes; the free-voyage to the place he may have chosen in our vast territory; all this is nothing more than a clear gift without conditions, which the Argentines make to those immigrants who wish to find a second country in their fertile fields.

Nor are these ample favors limited to the newly-arrived; the Intelligence-Office works for all alike, both the old and the new; for those who seek labor as for those who give it; and procures work for the one and hands for the other, without any remuneration. If persons already established in Buenos-Aires desire to go to the Interior to dedicate themselves to any productive occupation, assistance is never denied to them in the form of a free-passage. If therefore, the expenses of a passage from European ports to our shores are higher than to North America, the sum total of travelling expenses for the immigrants who come here is less than for those who emigrate to the United States, because on anchoring in the roads of Buenos-Aires, all subsequent expenses cease, whilst those who go to the Interior of North America have to spend a great deal for themselves and their luggage between the port of arrival and their final destination. These expenses not only exceed the difference in cost of the two voyages by sea, but often devour a capital sufficient for those of their first settlement.

The Commissions and Sub-commissions of Immigration are the local representatives of the General Commission. Their business is to foment immigration, and take care of the interests of the immigrant in his relations with the citizens and the authorities. Above all, it is their duty to watch over the exact fulfillment of

the engagements made by landed proprietors with the immigrants, and to assist the latter not only by counsel but also by deed, during the first days after arrival, when they are ignorant of the customs of the country. Finally, they are the agents of the General Commissary in all belonging to the *interning* of those immigrants who are transported at the expense of the State to the Interior; they always go consigned to their respective Commission and to the intermediary ones on their route, which have to receive, lodge, and feed them, until they are able to prosecute their journey.

The great importance of this duty of the Commission of Immigration and its sub-divisions is easily understood, when we consider the necessity of this removal of immigrants to the Interior. If it be remembered, that during the last twenty years Argentine soil has received more than half-a-million of immigrants, of which certainly 350,000 where laboring men—for on an average $\frac{2}{3}$ belong to the masculine sex—it is truly surprising that the country has not drawn more advantages from such an increase of hands. We do not mean to say by this, that the sacrifices hitherto made by the Argentine Republic in favor of immigration, have not been amply compensated by the great progress which it has made; but no matter how great they may have been, there was reason to expect greater yet, from such a considerable increase in population. It is true that our commerce has developed in a remarkable manner; and consequently also, the income of the State whose increase it is too easy to prove, is the logical consequence of the increase of immigration. But unfortunately, that which has come here up to the present, has only served to increase the consumption of foreign merchandise, whilst exportation has remained almost stationary. Yet, what the country wants above all, is an increase of production. At least ninety per cent. of the immigrants remained in Buenos-Aires and in the other cities and ports, thus contributing it is true, to their prosperity, and being content with their situation; but, inasmuch as the greatest part was composed of laborers from the European cities, it is easily understood that it did not think of cultivating the lands or exploiting their natural riches. The newly-arrived always preferred to gain his livelihood in the city, which appeared to him more convenient; thus he increased consumption without directly influencing production, and moreover, did not take root in Argentine soil. When he had gained enough to support himself without care in his native country, he turned his back upon the land to whose prosperity he had only indirectly contributed; and deprived it not only of his hands, but also of a part of its income derived exclusively from consumption. It was necessary to remedy this most important difficulty when once recognized, and thence arose the momentous interests connected with the dispatch of the immigrants to the Interior, which

is tantamount to acquiring them in favor of production. In this sense satisfactory results have latterly been obtained, but doubtless due in great part to the circumstance, that business is temporarily depressed in the cities, and that the opportunities of lucrative service are much less than in normal times.

If we wish to completely uproot this evil it is necessary to attract a different class of immigrants to the country; we do not mean to say a *better* class, but one which is more adapted to our requirements; *i.e.*, agriculturalists.

It is easy to prove not only theoretically, but still more by the flourishing condition of the agricultural establishments which are found at various points of the Argentine territory, that this class of immigrants easily fulfill their desires and do the best business. An intelligent emigrant does not leave his native land with wild and baseless hopes, nor with the expectation of an idle life in a new-country, whilst awaiting its treasures to fall at his feet. The farmer ought not to believe that he will find abundance all prepared for him in this country, more than in any other; rather he must foresee that in the beginning he must labor with courage and perseverance, and that his first labors will be rude; but in compensation he will be animated by the certainty, that he and his children will fully enjoy the fruits of his industry. The difficulties of the commencement depend greatly upon the qualifications of the beginner. The practical husbandman when assisted by the labor of his family, if he be tenacious and moderate and possess some resources, will naturally establish himself with greater ease than the proletary of the cities who is without them, and has never handled an axe or a plow. The latter has to make his apprenticeship and pay for it to boot, the same as every where else; but it may be stated that the first difficulties are more easily conquered here, than elsewhere. At all events, a good laborer moderate in his expenses, at least in the beginning, may be sure of good results in a few years; sometimes, even from the first harvest, he may find himself the owner of a capital which he never would have been able to collect in his native-land. We derive the proof that the agriculturist makes his fortune here, from the fact, that of the immigrants established in the cities a more or less considerable number re-emigrate, whilst the farmer returns to his country only to bring out his relatives and friends; and therefore a laborious and courageous farmer is considered as the best Agent of Immigration; he always attracts a respectable number of acquaintances; and some of them in the older establishments, have induced dozens of families to emigrate to the Argentine Republic. This attraction would be much more powerful were these establishments composed of a more homogeneous population.

The Province of Santa-Fé is the most advanced in respect to these agricultural centers, of which it possesses more than thirty. The colony of *Esperanza* in the city of Santa-Fé, is the oldest of these; although it is not more than twenty years of age, it has already planted several other "colonies."* That of *San Carlos* is even more important than Esperanza; it was founded by the Swiss although at present the Italians are in the majority. San Carlos and its branch colonies also, are in the vicinity of the city of Santa-Fé, from which point the colonies constantly extend towards the North, where they join those which have been recently founded in the Gran-Chaco. Towards the South of this Province, colonies have been founded by the Central Argentine Railway Company, which owns a wide belt of land along the line. Moreover, there are other private enterprises, so that there is hardly a district in the Province of Santa-Fé without its agricultural settlements, and an idea may be formed of their importance, when it is known that the value of the wheat-crop the past year was taken at $ 2,000,000 gold.

Here follow some statistics of the Colonies existing in this Province in 1874.

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* This is the term applied here to agricultural establishments, or centers, principally peopled by foreigners. *(Note by Transl.)*

Population and extent of the agricultural settlements of Santa-Fé.

Names of the Colonies.	Founded in the years.	Population.	Superficies, in squares.	Arable-land, in squares.
Esperanza	1856	1759	5945	1915
San Cárlos	1858	2110	19950	6582
San Gerónimo	1858	726	3872	1441
Guadalupe	1864	436	1280	434
Helvecia	1865	550	6400	1098
California	1866	57	5267	272
Cayastá	1867	323	1200	500
Cayastacito	1867	722	1938	100
Corondina	1867	203	252	248
Francesa	1867	88	485	164
Las Tunas	1868	353	3680	1101
Emilia	1868	370	4000	1000
Eloisa	1868	11	900	10
Humboldt	1869	835	8880	2325
Cavour	1869	375	2128	662
Grütli	1869	64	720	219
San Justo	1869	27	620	300
Galense	1869	22	480	34
Franck	1870	364	4560	1774
San Agustin	1870	813	8400	2342
Bernstadt	1870	1684	6229	2992
Cañada de Gomez	1870	319	1895	720
Jesús María	1870	890	3197	2864
Candelaria	1870	691	5664	3927
Germania	1870	216	1835	847
Alejandra	1870	417	4525	607
Nueva Italia	1871	6	180	144
Carcaraña	1871	386	12820	1485
Hansa	1871	95	1000	380
Cullen	1871	160	2000	500
Oroño	1872	202	1980	500
San Urbano	1872	236	225	142
Total		15510	119647	37635

The crops of the Colonies in the Province of Santa-Fé

Names of the Colonies.	Fanegas							Tobacco in arrobas.	Fruit-trees.	Mulberry-trees.
	Wheat.	Maize.	Barley.	Beans.	Maní.	Potatoes.	Sweet potatoes.			
Esperanza.....	663	5378	86	166	25	573	137	—	112380	3432
San Cárlos.....	18606	5480	284	239	—	—	247	—	132355	11290
San Gerónimo.....	497	5484	82	67	10	171	226	—	38429	174
Guadalupe.....	728	783	—	87	15	854	3483	—	7300	—
Helvecia..... ..	1906	3534	50	30	150	200	400	200	4000	—
California	650	350	—	—	—	—	—	—	223	—
Cayastá.....	2000	1908	—	160	100	270	135	45	1000	4
Cayastacito.....	77	469	—	—	—	—	71	—	523	—
Corondina.....	1300	200	—	40	—	60	1800	150	5000	60
Francesa	?	?	?	?	?		?	?	498	—
Las Tunas.....	1922	4927	20	61	—	97	44	—	15229	—
Emilia	4000	1500	—	50	—	100	—	—	2000	300
Eloisa	?	?	?	?	?	?	?	70	—	—
Humboldt.....	4522	7594	148	250	—	235	214	—	28790	10
Cavour	1685	3243	3	37	—	19	14	—	2900	20
Grütli.....	685	620	8	3	—	24	—	65	300	—
San Justo	250	200	20	100	—	—	100	60	1000	—
Galense	?	?	?	?	?	?	?	?	—	—
Franck	1999	4247	—	295	—	600	40	—	8011	67
San Agustin.....	4728	12127	—	130	—	—	--	—	56000	700
Bernstadt.....	5159	9864	33	72	—	2200	64	—	138700	100
Cañada de Gomez	1165	2139	10	30	—	220	180	30	55426	—
Jesús María	13127	19260	—	—	—	918	406	—	600	101
Candelaria.....	10700	12000	105	8	17	3000	1500	—	601000	35000
Germania.....	1264	3911	200	7	2	135	2	—	17500	—
Alejandra.....	800	1000	50	50	—	213	106	100	10000	—
Nueva Italia.....	?	?	?	?	?	?	?	?	100	?
Carcarańa	3650	11025	90	300	—	270	250	—	1500000	—
Hansa.....	438	2015	—	6	—	253	—	—	8000	—
Cullen.....	500	5000	—	40	60	100	100	100	5000	200
Oroño.....	800	2183	—	43	—	83	10	75	3837	—
San Urbano.....	243	358	7	—	—	450	—	—	3215	—
Total.....	84062	126799	1196	2293	379	10845	9159	895	2768316	51458

The crops of 1874, were in general less than the average. In some Colonies they were entirely lost.

Value of the property of the Colonies of Santa-Fé in 1874, taken in gold-dollars.

Colonies.	Value of lands.	Value of edifices.	Value of sowed fields.	Value of crops.	Cattle.	Implements	Trees.	Total value.
Esperanza.....	191457	461578	6451	18826	191170	177537	3473	1050497
San Cárlos.....	303750	280000	27612	153240	101621	309150	4309	1179682
San Gerónimo.....	60040	40005	5160	8258	48425	46794	1218	209900
Guadalupe.....	60400	67500	368	11578	24508	22580	213	187147
Helvecia.....	25700	7320	2143	3375	61151	17815	120	137624
California...	9100	7840	353	6900	12788	5614	150	42745
Cayastá.....	30000	15000	1174	224614	57122	17897	300	146107
Cayastacito.....	20180	29676	249	1580	64752	14540	15	130992
Corondina.....	18900	10950	602	12726	9262	10030	153	62623
Francesa.....	4090	1588	141	5200	21178	4118	15	36336
Las Tunas.....	44424	15550	2906	25403	14741	19024	456	122504
Emilia.....	70000	16000	1712	36657	22300	30861	60	177320
Eloisa.....	240	600	35	560	1500	2450	50	5435
Humboldt.....	11100	16905	4408	40714	48801	58185	863	280876
Cavour.....	50400	13475	774	10278	9244	15110	15	99296
Grütli.....	5375	1625	527	4087	5142	5360	9	22125
San Justo.....	6000	5000	440	3180	3596	2160	30	20412
Galense.....	480	385	124	3800	3700	530	50	9069
Franck.....	83400	11280	4613	25104	24428	31226	243	180294
San Agustin.....	168000	52700	7125	62203	68860	77267	1701	437856
Bernstadt.....	87092	165115	6006	66593	44026	132730	4164	505726
Cañada de Gomez....	43830	16840	2364	16563	17867	41400	1662	140526
Jesús María.....	100260	73860	12500	160162	38636	63040	183	448674
Candelaria.....	148000	131000	9919	130397	45690	106980	25350	597336
Germania.....	26200	38430	2839	17358	51146	63380	525	199908
Alejandra.....	21000	25000	4449	20809	27310	68620	300	167488
Nueva Italia.....	7000	4000	?	?	1428	1240	300	13968
Carcaraña..... .	403200	58800	2825	71101	17068	37053	75000	665047
Hausa.....	28550	18210	980	6470	7065	8295	240	69810
Cullen.....	30000	30000	1200	20599	58925	16140	150	157014
Oroño....	37600	13336	1942	12010	10147	9040	115	84190
San Urbano.....	4800	13350	184	3159	20811	4470	96	46870
TOTAL.....	2200474	1642918	124536	991042	1134438	1420456	121528	7635392

To this total value 30 % must be added, arising from the improvements in lands and edifices amounting to $ 1,153,017 in gold, and moreover, $ 1,500,000 in money possessed by the inhabitants, as well as $ 200,000 of capital invested in commercial and manufacturing operations. Thus we have a total of $ 12,288,409, of which sum not 10 % was imported to the country. The "colonists" therefore have gained $ 11,000,000 in gold.

The "colonization" of the Province of Entre-Rios commenced almost simultaneously with that of Santa-Fé, but soon became paralized. Two colonies were established, one called *San José* near the Uruguayan shore, and the other *Villa Urquiza* on the North of the city of Paraná. Both are flourishing especially the first, which is now one of the richest in the Republic; nevertheless, they do not exercise a powerful attraction for spontaneous immigration. Now however, the Government of this Province is propitious above all to the development of immigration, and understanding its great importance it has dedicated itself with exemplary zeal to foment it on a greater scale.

The surveys of some well-situated lands—which offer special advantages—are being made at present, and the arrival of agricultural families is contracted.

Efforts are also made to attract agricultural immigration to the Province of Corrientes, and taking into consideration the conformation of the soil and the climatic conditions of the colonies which may be founded there, it may be sure of a prosperous future. Lieut. Page, the commander of the surveying steamer *Waterwitch* which the United States sent to our rivers in 1853, and who, not satisfied with a glance, studied the regions he visited, could do no less in his official report than express his admiration at the extraordinary fertility of the soil, and prognosticated the grandest future for them, so soon as they be peopled by a good agricultural immigration.

Notable attention is also paid in the Province of Córdoba to attract population, and in general, all the Provinces manifest the liveliest desire to procure a competent agricultural immigration.

Although the Province of Buenos-Aires receives the greater part of the newly-arrived, it has done very little to assist colonization, probably, because the lands properly situated for this purpose are quite dear, and private speculations for the purpose do not offer as many advantages as those in other Provinces of the Republic. The only real *colony* which can be cited in this Province is found at *Baradero;* it is already in an excellent state of prosperity. The colonies recently founded in the interior of the Province —*i.e.*, in the pampa—of which *Concordia* is the most important, are as yet too young to be mentioned in this connection. The colony of *Chubut* far to the South and exclusively inhabited by Welshmen, is considered as a National possession, and depends directly upon the General Government, which is so prodigal in its efficacious attention that it may be considered as an isolated fact in the history of official colonization.

Although colonization has not reached as yet great importance in the Province of Buenos-Aires, nevertheless its great importance is well understood. For this reason, and inasmuch as private en-

terprizes do not now expect great advantages, the Government of Buenos-Aires has sent a "bill of colonization" to the Chambers, for the purpose of founding twelve model colonies in the most favorable districts. This project of the Government, excellent in every respect, will probably be accepted by the Legislature during the session of this year 1876.

The National Government, as we have already said, does not flinch under the considerable expenses caused by *interning* the immigrants, although the greatest part of them would prefer to remain in the cities. Yet the law imposes another obligation upon the National Government, which is, to settle the Public Lands; they are of many thousands of leagues in extent, and are not found—as in other countries—in the Interior beyond all means of communication, but are situated in great part on the Ocean as in Patagonia, or are crossed and bounded by immense rivers, like the Chaco and Misiones.

Inasmuch as these lands, in general so fertile and rich, are as yet depopulated, the Government determined in the bill of colonization of which we have already spoken, to grant special advantages to all those immigrants who should establish themselves upon them.

The principal conditions of this Government bill are:—

The advance of the passage-money from any European port to the city of Buenos-Aires.

The gratuitous gift of one hundred hectares of land to each of the first 100 families, which establish themselves in one of the sections already surveyed for colonization.

The sale of lands at $2 gold the hectare, payable in ten annual payments, commencing in the third year without interest.

Advance of food for one year at least.

Advance of working and brood-cattle, of seeds and agricultural implements, the building of a house, and in general, of all which a family may require in such conditions.

The entire advance, excepting the price of the land, cannot exceed $ 1000 gold per family, and is payable without interest, and at the cost-price of what they may have received in produce, in five annual instalments commencing after the end of the first year. Moreover, the colonists are free from all taxes during ten years, and after the colony is six years old, the State will give a prize of $ 10 per mill of trees at least two years old, planted by the immigrant.

We have to add that the Government purposes to grant these privileges chiefly to agricultural families, because they best fulfill the immediate necessities of the country; but at the same time the bill expresses the intention of also favoring artisans and every useful immigrant, because the country needs them, and they

will also find certain prosperity in these regions, as we have already proved in former chapters.

As yet, our entire immigration comes from Europe; no endeavors have been made to attract the Chinese who are so patient and frugal. Inasmuch as our population is already quite sufficiently mixed, some think that it would not be proper to introduce the Mongolian race at present; but it is undoubted that this tireless workman would make an excellent hand in our mining-districts, as well as in all our industrial establishments; and it is of incontestable importance above all for manufactures, to attract cheap laborers to the country.

The mission of the European immigrant is to become a proprietor; his assistants ought to come from other parts—China for instance—where population is so superabundant.

To this end an experiment is very desirable.

CHAPTER XXV.

THE ARGENTINE PROVINCES AND TERRITORIES.

We have already spoken in the third chapter of this book, of the difficulties in the way of acquiring an exact knowledge of the area of this Republic. We there mentioned the considerable difference between the report of the census which was officially accepted by a resolution of Congress, and that contained in the more recent work of Professor Burmeister. The last is based upon measurements made on the map by the aforesaid naturalist, which fix the total superficies of the country at 45,392 German-geographical-leagues—15 leagues to a degree; *i.e.*, one geographical-league = 7,420 kilometres. This result is not however, in accordance with the planometrical measurements made in 1873, in the highly reputed geographical establishment of Perthes at Gotha, rather approach the calculations of the Census in this respect, for they give a total superficial extent of 57,144 German-geographical square-leagues, or 12,000 leagues more than Dr. Burmeister; and this difference is almost entirely in favor of the National domain, inasmuch, as will be seen farther on, the extent of the greater part of the Provinces is already indicated. In this calculation made by scientific men, all those scientific means were employed which render it worthy of consideration, and we are therefore justified in using it for our present purposes. For the rest, this relative exactitude—positive it cannot be, because the country has never been surveyed—only concerns the National boundaries. The area of each Province cannot be determined by it, inasmuch as the inter-provincial limits, save in few instances as indicated on the maps, are not as yet fixed and recognized by law. Almost every one of the 14 Provinces claims lands considered by another—or even several others—as its property; and these questions of inter-provincial limits already pending for many

years, can only be settled by Congress, to which the Constitution has expressly left them. At the same time the limits of the Public-Domain will be fixed.

Notwithstanding the great difficulty of the solution of this complicated question of interior-limits, Congress can do no less than recognize the imperious necessity of its prompt settlement. Certainly it cannot be made without wounding many susceptibilities, because all the Provinces cannot be in the right; but it is not the less sure that a conciliatory course could be found, which, based upon equity, would be admitted by all parties. Perhaps the expedient may be resorted to of declaring that all lands in dispute belong to the Nation.

This short explanation was necessary to confirm our assertion, previously made in Chap. III, that the data upon the different Provinces of the Republic which follow, are only of conditional accuracy.

I. THE 14 ARGENTINE PROVINCES.

I. The Province of Buenos-Aires

Is the most important and the most developed of all the 14 Federal States; its population is at present about 750,000 persons. It is bounded on the North, by the *Arroyo del Medio* which empties into the river Paraná, by the Paraná itself, and finally by the river Plata; on the East, by the Atlantic Ocean; on the West, the frontier is open but constantly advancing, as is also the Southern frontier which separates it from the Public-Domain of Patagonia, whose limits have not yet been determined. Dr. Burmeister gives it an area of 4,300—the planometrical measurement of Perthes only 3,598—German-geographical-leagues, whilst the calculations of the Census would make 215,264 square kilometres. According to the report of Dr. Faustino Jorge, chief of the Provincial Statistical Bureau, the territory finally settled, *i.e.* that situated within the former Indian frontier, contains about 7,250 □ Argentine leagues. The Province is divided into three Judiciary Departments, and 70 districts, these last having each a Justice of the Peace as the local authority. The capital of Buenos-Aires is situated in 58° 21' 25'' Long. W. Greenw. and 34° 36' 35'' S. Lat.; it was founded by Pedro de Mendoza, but afterwards abandoned by the Spaniards, until Juan de Garay re-established it in 1580; and it forms a district by itself. It is the residence of the Governor who is assisted by two Ministers; the Provincial Legislature composed of two Chambers, also holds its sessions here. At the same time it is also the provisional resi-

dence of the National Government. This city rapidly increases, and, containing at present a population of about 300,000 persons, it is the most important commercial place of South America. Its construction is similar to all South American cities; the houses are low, generally of one storey and almost always with a narrow front upon the street, but with so much depth that they often contain three and four spacious court-yards, which permit the free circulation of light and air, so advantageous to both the living and sleeping apartments.

Buenos-Aires contains twenty churches and many public edifices, but only those recently constructed have any architectural value. Four quite-large theatres, attest the love of the inhabitants for the fine-arts.

Besides this city, the Province contains a quantity of towns, much less important it is true, of which we cite San Nicolas, Pergamino, Luján, Mercedes, Chivilcoy, Lobos, Chascomús, Dolores, Las Flores, Azul and Carmen de Patagones, as also more than a hundred burghs and villages, more or less important.

The principal occupation of the inhabitants is raising-cattle and preparing their products for exportation. More attention has latterly been given to agriculture, and if we cannot state that it has greatly extended, it has at least, made remarkable progress.

At the end of 1875, 37 districts alone, had 35,000 squares under cultivation; viz.—

11,887	squares		under	maize.
11,792	„		„	wheat.
5,423	„		„	lucerne.
2,207	„		„	potatoes.
1,229	„		„	barley.
243	„		„	beans.
182	„		„	sweet-potatoes.
100	„	more or less	„	vines.
99	„		„	peas.

The great horticultural establishments which generally surround large cities, are not herein included.

In this connection it is proper to mention specially, contrary to the idea latterly sustained that this Province and all the other littoral Provinces are not fit for vine-culture, that it has made most satisfactory progress even in the Southern districts of Patagonia and Bahia-Blanca, which are the least favorable for it. *

The Province possesses within the old Indian frontier, in all about 2500 leagues of land, which represent a present value of

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* *Vide* the Essay published by Mr. G. Claraz, in the *Revista Alemana*, 1876, Nos. 1 *et seq.* of Mr. Richard Napp.

about $ 12,000,000 gold. The foreign and domestic debt amounted to $ 32,000,000 at the end of 1875 of which $ 9,400,000 are for account of the Nation.

II. The Province of Santa-Fé.

The Northern boundary of Buenos-Aires at the same time forms the Southern boundary of Santa-Fé, a Province which extends iu a narrow band along the Paraná, and is bounded on the North by the National territory of the Gran-Chaco, from which it is divided by the small streams *El Rey* and *Las Vivoras;* the first empties into the Paraná and the latter into the Salado. The magestic Paraná forms the Eastern boundary, whilst on the West there is and no natural limit between it and the Provinces of Córdoba and Santiago del Estero.

The Census gives this Province an area of 117,269 □ kilometres, whilst Burmeister calculates it at 1500, and the measurement of Perthes at 1764, German-geographical leagues. On the 15th September 1869, its population amounted to 89,117 souls, which have increased to the present number of 160,000. It is divided into 4 Departments, but only contains two cities of importance; the capital, Santa-Fé, in 60° 40' Long. W. Greenw. and 31° 39' S. Lat., founded in 1527, and the city of Rosario much more populous; as the second commercial city of the Repnblic, it is well-known to foreign commerce.

But on the score of immigration-settlements this is the most prosperous of the Provinces, and it owes its rapid progress and its political importance as recognized by all the others, to the number of these which it contains. Like all the other Provinces it has a Governor and a Legislature in two Chambers, elected by the people.

Cattle-breeding, which a short time ago was the only occupation it may be said, of the inhabitants, since the establishment of these agricultural colonies has given way to them in many places; however, it is still of great importance. To the South, its territory is a plain destitute of trees, whilst on the North of the capital it is rather covered with forests, and therefore, the Fauna and Flora are much more varied than in the Province of Buenos-Aires.

According to the reports of the Inspector of Agriculture, there were about 33,000 squares under cultivation; viz.—

21,259	under	wheat.
9,815	„	indian-corn.
4,450	„	lucerne.
797	„	potatoes.
563	„	beans.
388	„	sweet-potatoes.
152	„	barley.

81 under peas.
58 „ pea-nuts.
45 „ tobacco.

Almost one half of the Province is public domain—1554 of the 3560 □ leagues—and the law fixes the minimum price of these lands at $ 1000 per □ league, but they can no longer be acquired for such a sum, because their value increases *pari passu* with that of the *colonies*.

III. The Province of Entre-Rios.

This is the Province which has most prospered by a spontaneous agricultural-immigration provided with some resources of its own. It would indeed be difficult to find another country upon the globe more appropriate for this purpose. Its soil is well watered, undulating, extremely fertile and adorned with superb forests, and promises the best results to the zealous husbandman.

Moreover, its geographical situation is most advantageous because it allows of an easy and prompt communication not found any where else. Throughout the Province there is no point more than 15 leagues distant from the shores of a powerful river. All the products of the temperate zone, such as wheat, maize, barley, colza, tobacco, hops, fruit-culture and the vine, prosper magnificently.

Whenever it be energetically undertaken to people this Province, it will make great progress in a short time, and competent persons predict that it will possess the hegemonic power of the Republic ere long. On the North, the small rivers *Guaiquiraró* and *Mocoretá* separate it from the Province of Corrientes; the powerful Uruguay bounds it on the East, as also the Paraná on the West and North. Thus, surrounded by these rivers, it is truly Entre-Rios—*ang.* between-rivers—; thence the origin of its name. Its area, divided into 14 Departments, is estimated at 113,789 □ kilometres by the Census, and by Dr. Burmeister at 1400 German geographical-leagues, whilst the measurements of Perthes only give 1216 geographical-leagues.

The inhabitants are principally occupied in the raising of cattle, and amounted in 1869 to 134,271 persons; at present they are estimated at 180,000. Its exceptional situation upon two of the largest rivers in the world, has given rise in an exceedingly short time to a quantity of flourishing villages; viz., Concepcion-del-Uruguay, Concordia, Villa-Colon—the port of the San José *colony*—Gualeguay, Gualeguaychú, Nogoyá, Victoria, La Paz and Paraná. The latter was for some time, the seat of the Federal Goverment. Concepcion-del-Uruguay in 51° 14' W. Long. Greenw. and 32° 30' S. Lat., founded in 1778, is the Provincial capital.

Although this Province offers such incomparable advantages to

agriculture, whether considering its extent or its system it yet languishes in a poor enough condition. The soil is cultivated in only 4 of its districts, not amounting to 8000 squares in all, of which have been planted:—

3,300	with	maize.
3,030	„	wheat.
939	„	potatoes.
290	„	barley.
165	„	sweet-potatoes.
124	„	beans.
51	„	peas.
30	„	pea-nuts.
30	„	mandioca.
20	„	tobacco.
8	„	vines.

A great part of the lands belong to the Public-Domain, the exact extent of which will be fixed by the survey at present in operation. The price of land here, as in all parts of the Republic, is very low.

IV. The Province of Corrientes

Forms the Northern part of the Argentine Mesopotamia, which is composed of it and Entre-Rios. It is equally endowed by Nature with a most fertile and well-watered soil, and owing to its Northern position its climate is almost tropical; indeed, it rivals the neighboring Republic of Paraguay in the exhuberance of its vegetation.

This Province is also almost surrounded by rivers; on the N. East is the river *Aguapey* and its imaginary prolongation, which separates it from the ancient empire of the Jesuit-Missions, which it nevertheless considers as its property, although they are generally recognized as making part of the National domain. The Paraná bounds it on the West and North, the Uruguay on the East, whilst on the South, the small streams of *Guaiquiraró* and *Mocoretá*—the first of which empties into the Paraná, and the other into the Uruguay—separate it from the Province of Entre-Rios. According to the Census, its area is 125,265 □ kilometres; according to Dr. Burmeister, it is 1500 German geographical-leagues, and Perthes makes it 1054. It is divided into 22 districts with a present population of 180,000 persons; the Census of 1869, gave 129,023.

Cattle-breeding is the chief occupation of the Correntines, but they are also engaged in the explotation of the forests—or rather their destruction—on a large scale, because a large part of the soil is covered with magnificent forests full of pre-

cious woods. It is known that a great part of this Province belongs to the Public-Domain, although no new data have determined its extent.

In comparison with pastoral interests, agriculture is of small consideration, although the contrary should be the case in view of its almost tropical productions. Of its 22 districts, only 12 were cultivated in the following proportions:—

2244	squares	with	maize.
759	„	„	mandioca.
742	„	„	tobacco.
403	„	„	potatoes.
245	„	„	pea-nuts.
182	„	„	beans.
151	„	„	sugar-cane.
58	„	„	cotton, etc.

Fruit-culture is quite important, notwithstanding it is actually almost exclusively limited to that of the orange, which is exported in immense quantities to Buenos-Aires and Monte-Video. Many forest-trees bear excellent fruit, and the cultivation of fine fruit in the Province could be immeasurably developed.

Among the most important cities we name: Corrientes, the Provincial capital founded in 1588 and situated at 58° 52' 50'' W. Long. Greenw. and 27° 27' 30'' S. Lat.; Goya, Bella-Vista, Empedrado, Monte-Caseros, Mercedes, and Paso de los Libres.

V. Province of Córdoba.

This is the most important of the Interior Provinces, and has an area of 217,019 kilometres, 3225 □ German geographical-leagues according to Burmeister, and according to Perthes 2614. At the epoch of the Census its population was 210,508, but it is considered to be 280,000 persons at present. It is bounded on the North by the Province of Santiago and Catamarca; on the West by Catamarca, Rioja and San Luis, on the East by Santa-Fé and Buenos-Aires, and extends on the South to the properly-called pampa; it is deprived on all sides of natural boundaries.

Although this Province also possesses plains of great extent and bearing very good pasturage for the raising of cattle, an uninterrupted level is not found inasmuch as the first mountainous part of the Argentine Republic is found in the Sierra of Córdoba. From this greater diversity in the configuration of the soil, a greater variety of occupations arises among the inhabitants. Along with the breeding of cattle and agriculture, mines of copper and silver are exploited in a lucrative manner; the cultivation of fruit has also become of some importance, although far distant from what it can be made in the future. The slopes of the Sierra, ex-

posed to the sun and in part well-watered, invite the culture of the vine on a large scale, whilst the vallies, owing to their constant climate, are admirably adapted to the raising of the silk-worm. This Province possesses a great many forests, not alone on the mountains; yet they cannot be compared either in extent or in the quality of the timber, to those of other Provinces. The climate is generally dry, but, inasmuch as artificial irrigation, although introduced centuries ago, is not applied according to rule, agriculture has not yet taken a vigorous development.

At the close of 1875 there were not quite 11,000 squares under cultivation, divided as follows:—

3860	squares	under	indian-corn.
3400	„	„	wheat.
2650	„	„	lucerne.
604	„	„	tobacco.
142	„	„	potatoes.
70	„	„	beans and peas.
6	„	„	barley.
6	„	„	pea-nuts.
4	„	„	vines.

A variation from the method of breeding-cattle in the littoral Provinces, is already remarked at Córdoba, and becomes more and more accentuated according as the Andes are approached. The artificial cultivation of forage for the purpose of fattening the animals is more attended to, although stall-feeding is not the custom anywhere. Goats are also bred here, which is not done in the littoral Provinces.

The city of Córdoba at 64° 10' 2'' W. Long. Greenw. and 31° 24' S. Lat. was founded in 1573, and is the Provincial capital; it passes as the "city of *savants*" because the University which is the second in age of all South America, is found there, as also the Astronomical Observatory, and the Central Meteorological Bureau of the country. The Province contains another important city, Rio-Cuarto, and does not lack boroughs and villages. It is divided into 22 Departments, subdivided into 118 districts or constabulary jurisdictions.

VI. Province of Santiago-del-Estero.

This Province whose superficial area is 108,933 square kilometres—according to Burmeister 1720 □ German geographical-leagues, and 1436 according to Perthes—although it pretends to have a jurisdiction three times greater, is one of the least flourishing of the Republic. A somewhat considerable part of it belongs to the botanical Formation of the Monte, which is the least fertile, and, inasmuch as extensive salines are found within

its limits, its inhabitants are obliged to struggle with difficulties unknown to the other Provinces. A proper use of the fertilizing element water, which is not wanting, would do wonders here, by converting extensive quagmires and dunes into most fertile fields for agriculture. A great part of the Province is still public property, and the price of land is so very insignificant, that it may be bought for $ 100 gold per square league.

At the time of taking the Census, Santiago had a population of 132,898 persons, whose increase since 1869 may be taken at 40,000. The present total may be taken at about 175,000, which is maintained by raising-cattle, by agriculture and domestic manufactures. According to official data, 3400 squares were under cultivation in 1875, as follows:—

1665	squares	under	indian-corn.
1495	„	„	wheat.
342	„	„	lucerne.
11	„	„	sugar-cane.

It is supposed that these figures are too low, because the cultivation of the sugar-cane is much generalized, although it it surpassed by that of artificial pastures, and in some districts the cultivation of vines gives good results. The cultivation of fruit-trees is not insignificant, and the *Santiagueño—ang.* inhabitant of Santiago—knows how to exploit the forests whose *algarrobos* and *cacti* produce fruit which—whether raw or prepared in different ways—nourishes both men and beasts throughout whole districts. The women of this Province are famous for their constant assiduity at the loom, although in reality there is but little welfare among the people.

Any occupation on a large scale would find a vast and favorable field here, because, not only is the price of labor very cheap, but domestic manufactures which—although empirically—are developed every where, have accustomed the laborers to industrial activity. On the other hand the railway from Córdoba to Tucumán, which crosses the Province, and the canalization of the river Salado, which will certainly soon be done and thus make the river navigable far within the Province, will produce an easy communication with our ports; and, inasmuch as the raw material abounds for many different manufactures, it may be said that the principal conditions exist in Santiago to render it flourishing.

The Southern boundary of the Province is Córdoba; the Eastern, the Chaco; the Northern, Tucumán and Salta, and the Western, the Province of Catamarca. The city of Santiago-del-Estero was founded in 1553, and is in 64° 22' 15'' W. Long. Greenw. and 27° 46' 20'' S. Lat. It is the seat of Government, and the only center of population of some importance within the Province, which is divided into 18 Departments with numerous subdivisions.

VII. Province of San Luis.

This Province is bounded on the East by Córdoba; on the N. E. by San Juan; on the North by Rioja, and on the West by Mendoza. Its Southern frontier is open and bounded by the pampa. Its present population is estimated at 70,000 souls, although in the Census it had only 53,294. According to the same Census its superficial area is 126,890 square kilometers; according to Burmeister, 1075 □ German geographical-leagues, whilst Perthes gives 1102. The capital is San Luis, founded in 1597 in 66° 15' 40'' W. Long. Greenw. and 33° 25' 45'' S. Lat. It is the only city in the 8 Departments into which the Province is divided, although Mercedes, a garrison-town, should also be mentioned; here the Transandine railway which starts from Villa-Maria, terminates for the present. Although cattle-breeding is the principal occupation, some attention is also paid to agriculture, the most important part of which is the raising of extensive fields of lucerne for the purpose of fattening the cattle destined for export to the Pacific coast.

According to the reports of its Agricultural Inspector, more than 10,000 squares were under cultivation at the end of 1875, as follows:—

4560	under	indian-corn.
3595	„	lucerne.
1740	„	wheat.
98	„	barley.
58	„	vines.
36	„	beans.
14	„	potatoes.
3	„	tobacco.

By this it may be perceived that this Province is fit for the cultivation of all the productions of the temperate-zone. But its principal wealth is in its mountains—the sierra of San Luis—which cover immense treasures of the precious metals. The mines already opened are principally of gold, and many of them are under explotation in different districts of the Sierra; copper—generally so important in a mining point of view—is also found there. * If, as yet, mining has not given the brilliant results which may be expected from the extraordinary richness of the sierra, it is due to local causes which may be easily destroyed. Alongside of mining, an important trade in cattle is found in connection with its allied branches, as it is to be remarked that San Luis is one of the principal resting-places for the droves of cattle which are driven from the littoral Provinces to the markets of Chile.

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* See the articles of H. E. Avé Lallemant, in the *Revista Alemana* for 1873-4-5.

VIII. The Province of Mendoza.

Is bounded on the North by that of San Juan; on the East, by San Luis; on the South, by the pampa, and on the West by the frontier dividing Chile from the Argentine Republic, along the Western-ridge of the Cordillera. According to the Census its area is 155,745 square kilometres; according to Dr. Burmeister it is 1720 German geographical-leagues, and Perthes gives 1602, according to the planometrical measurements already cited as made in Gotha. At the time of the Census there were only 65,413 inhabitants throughout this extent who may have increased to 90,000 at present. With the exception of Mendoza, the capital which was founded in 1559—destroyed by a great earthquake and rebuilt in 1861—in 68° 45' 39'' W. Long. Greenw. and 32° 53' 5'' S. Lat., the Province possesses no city, because Luján, San Vincente, San Rafael, etc. are only villages. The Province is divided into 12 Departments, in 11 of which 7968 squares were cultivated at the end of 1875; this is a low figure, because a relatively considerable agriculture exists in Mendoza, owing to the benefits derived from the artificial irrigation provided by the waters of the streams which come down from the Cordillera; although it is not as much as would be furnished were the system regulated with more art; it is this that is wanting. The above-mentioned amount is divided as follows:—

4763	squares	under	wheat.
1582	„	„	indian-corn.
680	„	„	lucerne.
543	„	„	vines.
137	„	„	potatoes.
130	„	„	beans.
121	„	„	barley.

The small quantity of land reported as under lucerne, is the proof of a great error in these data, for it is notorious that this crop is cultivated on a great scale in Mendoza. Indeed, it is necessary before undertaking the passage of the Andes, to strengthen the animals by means of a nutritious pasturage, so that those destined for Chile may arrive at the market in a condition to be butchered: this is done by grazing them in the fenced fields of lucerne, and, inasmuch as they must cross Mendoza on their way to Chile by the pass of Uspallata, which is the easiest communication with the Pacific coast—and more than 50,000 head of horned-cattle without counting horses and mules leave the Province per annum—it is clear that the above-mentioned number of squares of lucerne, must be much below the truth. All the remaining data must be alike inexact; thus, for example, we only find 543 squares

planted to the vine, when it is precisely in this Province where viticulture is of the greatest importance. The vine of which there is a great variety, is planted here for the purpose of making an agreeable well-bodied wine, which is compared by some connoisseurs to the best kinds of Burgundy, although its preparation is so empirical that the quality is frequently injured. Quantities of raisins are also prepared here, as well as throughout the country, in a most irrational manner. Mendoza likewise produces some other dried-fruits, such as peaches, figs, olives—also in brine—and nuts; the plantations of Lombardy poplar, from which much benefit is derived in some districts, are also worthy of mention.

The high mountains which occupy the Western part of the Province, abound in rich minerals, and although the mining interests are as yet small, a brilliant future may be prognosticated for them. The *Mendocino* miner carries his ores to the neighboring founderies of Chile, where they are smelted, and thence embarked for Europe as of Chilean production; and this communication between the two countries is quite active.

IX. Province of San Juan. *

Like the two preceding Provinces, San Juan was peopled from that portion of Spanish colonial territory which is now the Republic of Chile, and they were all in strict administrative alliance with it under the name of the Provinces of Cuyo, before the erection of the Vice-royalty of the Rio de la Plata; this name still popularly clings to them. The Southern boundary of San Juan is Mendoza; the Northern and N. Eastern, Rioja; the Eastern, San Luis; whilst on the West the Province reaches Chile. Mountainous features are more pronounced here than in Mendoza, and mining is more developed, principally in the gold and silver veins. It is very probable that its object may change ere long, inasmuch as the Province contains beds of fossil-coal, to all appearance very rich. Agriculture is also of much importance here, because the *San Juaninos* know how to take advantage of the water-courses which descend from the mountains. According to the official data so often above mentioned, 36,659 squares were under cultivation, although the book of Sr. Igarzabal says that 44,407 ½ squares were cultivated in 1871; since then the amount has constantly increased. Of these 36,659 squares more than two-thirds were planted in lucerne, *i.e.*, 26,205 squares; in Mendoza where this forage is cultivated at least on the same scale, only 680 squares appear in the official report. The remainder was as follows:—

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* The prize work of D. Rafael Segundo Igarzabal, *La Provincia de San Juan en la Esposicion de Córdoba, Buenos-Aires* 1873, contains a detailed description of this Province.

6525 squares under wheat.
2021 „ „ indian-corn.
1216 „ „ vines.
193 „ „ beans.
157 „ „ barley.
120 „ „ tobacco.
110 „ „ flax.
64 „ „ cotton.
32 „ „ potatoes.
15 „ „ pea-nuts, etc.

Wine-making is relatively insignificant, because the *San Juaninos* make but little must. On the contrary, this Province exports a large quantity of raisins, as well as stoned and unstoned dried peaches, figs, etc. Like Mendoza, San Juan carries on an active import and export commerce with Chile, the latter consisting principally of horses and mules and horned-cattle for the shambles.

The capital of the same name, and the only city in the Province, was founded in 1561; it is situated in 68° 35' 30'' W. Long. Greenw. and 31° 31' 31'' S. Lat. The Province contains an area of 103,998 square kilometres, or 1566 German geographical square leagues, which are populated by 85,000 persons more or less, the number being only 60,319 at the taking of the census.

X. Province of La Rioja.

The Spaniards coming from the Pacific Ocean, founded the city of Rioja during 1591, in a district thickly populated by the tribe of *Calchaquis* Indians. It is situated in 67° 1' 16'' W. Long. Greenw. and 29° 18' 15'' S. Lat., and it is the capital of the Province of the same name, which, according to the Census—evidently too low—contained only 48,746 souls. Inasmuch as this sum should be augmented one half, its actual population may be taken at from 70 to 75,000 persons. Its area is estimated at 110,786 square kilometres; according to Dr. Burmeister it is 4500 German-geographical square-leagues, and 1629 according to Perthes. Next to the city of Rioja, the most important villages of the Province are, Villa-Argentina or Chilecito, Famatina and Guandacól. The Province is situated between San Juan, San Luis, Mendoza, the Republic of Chile, Córdoba and Catamarca. Its most important and famous ores are described in Chap. X, to which we refer. The cultivation of the vine and fruit-trees, is also important here and not devoid of interest, when we know that the Department of Chilecito produced above 700,000 litres of generous wine, during the year 1875.

In nine Departments 10,000 squares were under cultivation, to wit:—

3005	with	vines.
2707	„	wheat.
2550	„	indian-corn.
750	„	lucerne.
150	„	beans.
73	„	barley.
5	„	cotton.

XI. The Province of Catamarca. *

Bounded on the South by La Rioja and Córdoba; on the North by Salta and Bolivia; on the East by Santiago del Estero and Tucumán, and on the West by Chile; the superficial extent of this Province is calculated at 242,309 square kilometres, or, according to the respective measurements at 1940 and 1984 German-geographical square-leagues. At the time of taking the popular census it held 79,962 inhabitants, whose number ought to be raised at present, to 115,000.

The city of Catamarca was founded in 1680, at 65° 54' 44'' W. Long. Greenw. and 28° 28' S. Lat., and is the capital of the Province. Tinogasta, Fuerte de Andalgalá and Belen may be mentioned as centers of population. In this Province—as in the neighboring one of Tucumán although in few places—very productive alpine milk-farms exist, and much attention is also given to agriculture. In particular the culture of the vine has latterly become of much importance, and at present—in the Department of Andalgalá, for example—wines are made, at least equal to those produced in the other vine-districts of the Republic.

According to the report of the Agricultural Inspector 8000 squares were under cultivation in 13 Departments, of which:—

4339	were	under	lucerne.
2311	„	„	wheat.
1121	„	„	maize.
239	„	„	beans.
67	„	„	barley.

The extent of vineyards has not been given, because the respective report—like the greater part of those made by the Inspectors—is defective. Nevertheless, we have inserted them in this chapter because they give an approximate idea of the state of Agriculture throughout the Republic.

Mining industry is found in a state of great activity in Cata-

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* *La Provincia de Catamarca, B.-Aires* 1875, a valuable work by D. Federico Espeche, gives interesting information upon this Province, A long dissertation of Mr. F. Schickendantz, is also found in *La Plata Monatschrift*, for 1875, a periodical edited by R. Napp.

marca, and explotations of mines and founderies exist in this Province, which leave but little to desire in respect to their methods and technical administration. The present mining operations are principally limited to copper-ore, but a considerable number of silver-mines exist, and in some hilly-districts iron-ore abounds. The quantity, as also the great richness of the ore, are not sufficient to make its manufacture profitable as yet, because here, as in all the mining districts of the Republic, capital is wanting, and the difficulties and consequent dearness of transport impede the flourishing progress of mining.

Mention ought to be made of a special industry in some parts of the Province; it consists of the domestic manufacture of the finest textures of Vicuña-wool, with which the women of the district of Andalgalá principally occupy themselves. A ladies shawl of fine Vicuña-wool is worth from $ 100 to 250 gold.

XII. The Province of Tucumán. *

Bounded on the South and West by Catamarca; on the East by Santiago del Estero, and on the North by Salta; here is found the Province of Tucumán, the garden, of which the Argentine Republic has every reason to be proud; and whose natural beauties induced Prof. Lorentz to call it the phytographical region of the *Parque*. So far as regards its extent, it is the smallest of all the Argentine Provinces, inasmuch as its area does not exceed 65,259 square-kilometres according to the Census, and according to Dr. Burmeister, 750 German-geographical square-leagues; Perthes gives it only 566. On the other hand its population is relatively dense, and the Census gives it the second place in this respect; yet if we pay attention to the planometrical measurements above inserted, it holds the first rank. At the time of taking the Census it contained 108,953 inhabitants; now it must have more than 150,000. There are no public-lands in Tucumán; they are all private property, and relatively well cultivated; *i.e.*, that proportionally, there is much more cultivated land than in any other Province. The Inspector of Agriculture for that district, says that the quantity of land under cultivation amounts to 24,000 squares; to wit,—

9846	under	indian-corn.
6945	„	wheat.
1736	„	rice.
1727	„	lucerne.
1212	„	sugar-cane.
902	„	barley.

* A good description of this Province is found in the interesting work of D. Arsenio Granillo, *La Provincia de Tucuman*, *Tucuman*, 1872.

474	under	tobacco.
49	„	beans.
83	„	peas.
73	„	pea-nuts.
37	„	potatoes, etc.

Cattle-breeding is also very important, and—as already has been said—milk-farms are established in the high-lands here, whence comes among other products, the celebrated cheese of Tafí. Nor is the culture of fruit-trees neglected, but, considering the extraordinarily favorable climate and fertile soil which this Province enjoys, this branch of industry ought to be of much greater importance, and absorb a special interest of which it is destitute at present; notwithstanding the sweetmeats made by the *señoritas* of Tucumán, are most exquisite. It is to be hoped however, that an active trade will be developed as soon as the railway to Córdoba be open to public service, which is anticipated to occur in July 1876. Only then will the coast-markets be fully reached by the products of this Province. The tanning of hides, sugar making, the distillation of rum, as well as the planting of rice and tobacco are quite important at present, and the explotation of the forests will become a source of real prosperity. As yet mining does not exist in Tucumán, because the inhabitants possess so much welfare with such an easy life, that they have not yet thought of dedicating themselves to the rude task of dissecting the earth in search of its mineral treasures.

The Province is divided into 10 Departments, and the seat of Government is the city of Tucumán, which was first founded in 1565, and again in 1685 on its present site, in 65° 17' 20'' W. Long. Greenw. and 26° 50' 2'' S. Lat. It is the only city in the Province.

XIII. The Province of Salta.

This Province has also been richly endowed by Nature, at least in the greatest part of its territory; for, although there are some arid spots, there are others which in respect to the fertility of the soil, a natural and abundant irrigation, and a benign climate, yield nothing to Tucumán, which is saying much.

The reports of its agriculture from 4 only of the 21 Departments, give 10,500 squares as under cultivation, in which occupies the first rank

Maize	with	7077	squares.
Lucerne	„	1692	„
Wheat	„	1062	„
Vines	„	181	„
Sugar-cane	„	172	„
Potatoes	„	154	„

Beans	with	62	„
Barley	„	44	„
Mandioca	„	20	„
Tobacco	„	17	„
Peas	„	12	„
Pea-nuts	„	6	„

It must be remembered that the returns only embrace the fifth part of the Departments. The wine of *Cafayate* is represented as very good, as also the different fruits in which the Department of Orán—as if specially created for the cultivation of inter-tropical products—particularly excels. It is said that the bananas which grow there are even better than those of Brazil; and as for the coffee, it is very superior to that produced in the neighboring empire. A brilliant future awaits this part of the Province, so soon as the navigation of the Vermejo is freed from the obstacles which yet exist in the upper part of its course; because this river empties into the river Paragnay, and with it passes into the Paraná, and thence to the river Plata and Atlantic Ocean.

Nor would the district of Orán be the only one benefited by this fluvial improvement—or rather canalization—which can be carried out at very little cost. All the Province, as also Jujuí and Tucumán, would rapidly reach a flourishing condition due to the advantages which the opening of the upper part of this river would give to the exportation of their products; and it would convert Salta into a central-market of deposit and shipment for the products and metals of the rich Republic of Bolivia, with which it already holds quite an active commerce.

The Province is bounded on the West by Bolivia; on the South, by Tucumán and Catamarca; on the East, its frontier is open to the Chaco, whose territory is claimed by Santiago, whilst on the North it is bounded by Jujuí. According to the Census it has a superficial extent of 155,847 square kilometres, whilst the other authorities mentioned, give it respectively 2,050 and 1,529 German-geographical square-leagues. In 1869, it held 88,933 inhabitants, whose number must have increased at present, to 130,000 souls. With the exception of its capital, Salta, it has no other city, because Orán has not yet reached that rank. This capital is situated at 65° 31' 7'' Long. W. Greenw. and 24° 47' 20'' S. Lat. and was founded in 1582. The Argentine Republic has never recognized as legal, the separation of that part of the Province of Salta, which at present constitutes the Bolivian Province of Tarija. (See Chap. III).

XIV. The Province of Jujuí.

This is the last, and least populous Province of the Argentine Republic, inasmuch as at the time of taking the Census it only con-

tained 40,379 inhabitants; even now, it ought not to contain more than 55,000. But the readar must not be induced to imagine from this, that its area is small; on the contrary, the same Census gives it 93,905 square kilometres, which Dr. Burmeister calculates at 1000, and the planometrical measurement of Perthes to reach 1132, German-geographical square-leagues.

The want of density in population must be attributed to the sterility of the Western part of this Province, as also to its isolated situation in the Northern corner of the Republic. An immense region separates it from the Atlantic, whilst the road to the Pacific which is the nearest, is most difficult on account of the mountains whose peaks, starting from precipices and profound abysses ascend to the clouds, and also owing to the deserts which have to be passed before reaching the Western coast.

The railway to Tucumán; its prolongation to the capital of this Province; and particularly, the deepening of the upper Vermejo, *i.e.*, the river Grande de Jujuí—its principal tributary; will develop it so much the more, inasmuch as its people are very active and industrious. This is proved by its important exports to Bolivia, which consist not only of the natural productions of the country, but also of many manufactured articles.

According to the very defective report of the Inspector of Agriculture—which, for example, makes no mention of rice—3000 squares are under cultivation, as follows:—

830	under	wheat.
821	„	indian-corn.
540	„	lucerne.
315	„	sugar-cane.
211	„	barley.
129	„	potatoes.
51	„	beans.
25	„	mandioca.
13	„	tobacco.
8	„	sweet-potatoes.
6	„	pea-nuts.
5	„	cotton.
4	„	coffee.
1	„	vines.

This Province which is enclosed by Bolivia and Salta, is divided into 13 Departments. It possesses two small cities, each containing a little more than 3000 inhabitants; viz., Ledesma and Jujuí; the latter is the capital, and is situated in 65° 20'' 39'' W. Long. Greenw. and 24° 10' 59'' S. Lat.

It was founded in 1592.

II. THE FEDERAL TERRITORIES.

It is not easy by any means to write upon regions which, so far as regards extent, excell more than one European empire, but whose exploration is yet reserved for a future, it may be hoped not far distant. *Sketches* are not wanting of one or other of our Territories, but the indifference with which these descriptions are regarded is proof of their small importance; yet, although our book ought not to spread abroad notoriously erroneous data, we can do nothing more than limit ourselves to those reports which appear to merit the greatest faith.

I. Patagonia.

Thanks to the kindness of Messrs. Heusser and Claraz, who doubtless are those best acquainted with Patagonia, and from whose reports we have quoted more than once during the course of this work, we can give relatively important information about this Argentine Territory, the most extensive of all our possessions. As we have already said, Chile attempts to dispute with the Argentine Republic her good rights of possession to Patagonia; but to be convinced of the injustice of the pretensions of our neighbors, it is sufficient to read the excellent work of Dr. Quesada, *Patagonia y las Tierras Australes*, which most completely annihilates all that the Western Republic has been able to allege in favor of its pretended rights.

The reports about the area of this immense region differ very much from each other, since whilst the Argentine Census calculates that it contains 1,086,925 square-kilometres, Dr. Burmeister—although he places the limits with Buenos-Aires much to the North—only gives it 8000 square-geographical-leagues; whilst Perthes makes it 17,700, and Messrs. Heusser and Claraz make it at least 12,800. These gentlemen in their reports, which they have with deference placed at our disposition, say as follows:—

"By the name Patagonia, every one understands the triangle that ends at the South of the American continent, and is not bounded on the West by the Pacific Ocean, but by the Cordillera of the Andes which runs almost parallel with its coast; although few imagine the extent of this triangle towards the North, where it is lost in the limits of the pampas. Its geological features alone give us a frontier based upon natural conditions. It is known that the Diluvian-deposit which has formed the pampas, extends over the estuary of the Patagonian tertiary-formation. These lands surround the others on the South and North. But the limits of each formation is little known, and should this geological circumstance be taken as a basis, it will cause Patagonia to advance far

towards the North;—according to D'Orbigny and Stelzner (Chap. VI) the Patagonian-formation crops out in Paraná, Province of Entre-Rios—. Therefore, the limit must be arbitrarily settled.

The district of the Province of Buenos-Aires called Patagonés, begins at the river Colorado, which D'Orbigny and Darwin consider—although without reason—as the limit of Patagonia; for the Colorado cannot be taken throughout its course as the Northern boundary of Patagonia, because, at a few leagues from its mouth, its course from East to West turns so much towards the North, that all the Province of Mendoza would have to belong to Patagonia. We are inclined to believe that the Patagonian and Pampean formations touch at Bahia-Blanca, and perhaps yet farther to the North.''

This immense region, including the districts belonging to the jurisdiction of Buenos-Aires, is inhabited by hardly 4000 Christian settlers, although it is crossed by many tribes of Indians in reference to whose numbers we have no exact data; the Census estimates them at 30,000. The most important "colonies'' are limited to two points; the river Negro and the river Chubut. The valley of the Negro river is settled as far as 25 leagues above its mouth; but only its valley, because at two leagues distant both North and South of the river, it would be difficult to find a single habitation. The village of Carmen de Patagones, under the control of Buenos-Aires, is situated upon the right bank of the Negro, seven leagues above its mouth; and some short time ago another settlement almost as large, was formed on the opposite bank. More or less equi-distant from the rivers Negro and Colorado, along the sea-coast as far as the gulph of San Blas, various isolated messuages are found. There is no sedentary population whatever on the banks of the river Colorado, excepting a small fort weakly garrisoned; only small groups of hunters occupied in the chase of ostrichs and guanacos, continually cross this valley.

The inhabitants of Carmen de Patagonés—according to the Census 2567 in number—are partly maintained by trading with the Indians who sell them ostrich feathers and skins, also guanaco and other skins and rugs, made of peculiarly manufactured pelts called *quillangos;* and partly by the cultivation of small farms and *estancias.* Latterly they have also undertaken the culture of the vine, which promises to prosper in time, inasmuch as there is no danger of injury to the harvests.

The next Christian population of consideration is the establishment of Chubut, founded by Welshmen. This "colony'' does not enjoy continual success, notwithstanding the Government of the Republic has sent it valuable assistance. Its inhabitants pursue the same occupations as those of Carmen de Patagonés.

Throughout the whole great region which lies between Chubut

and the Straits of Magellan, where Chile has founded the settlement of Punta Arenas, only two other settlements are found situated at the mouth of the Santa-Cruz river. One belongs to the well-known and esteemed Argentine mariner, Luis Piedra Buena, whom Musters, mentions in a most circumstancial manner in his book; and the other to M. Rouquaud, a Frenchman.

In addition to the four rivers we have just named, Patagonia has another the Deseado, which like the others comes from the Cordillera and empties into the Atlantic Ocean. The region between the river Negro and the Straits of Magellan extending some 173 German-geographical-leagues, or about 245 Argentine-leagues, is therefore only crossed by five rivers, so that there is only one river for every 61½ leagues; an absence of water the more sensible from the want of permanent lagunes. Although we have no pluviometrical data upon Patagonia, it is acknowledged that as an advance is made to the South from Buenos-Aires, there is constantly less rain-fall. It rains less in Bahia-Blanca than in Buenos-Aires, and again less in Patagonés than in Bahia-Blanca. This want of water renders a journey along the coast very difficult, to which may be added that it is as yet a *terra incognita*. Even the Indians shun it, and make their periodical visits to the littoral settlements of the Chubut and Colorado by the Eastern water-shed of the Cordillera, until they reach one of the rivers, whose course they follow, and returning by the same track they skirt the Cordillera again to the first river down which they follow again, as before.

It was said in Chap. VII, that Patagonia is composed in its totality of a vast plain similar to that of the pampa, but that it is crossed by many depressions; therefore its plains may be called high-levels, because in reality they contain a quantity of small sierras which are partly—principally in the Southern extremity—points and branches of the Cordillera, and partly independant elevations like the Sierra de San Antonio, which rises immediately on the coast in 42° S. Lat., and consists of pure porphyry. Between the port of San Antonio in 41° S. Lat. and the sierra just named, other small mountains rise at so short a distance, that in clear weather they can be seen from seaward confounded together. It is probable that these mountains are composed of eruptive rocks of modern formation, a presumption which is founded upon the fact that as one advances towards the South from the river Negro, pieces of magnetic iron-stone, of basalt and of pummice-stone are found on the surface; in a word, these traces of modern eruptive stones correspond to the "outposts of the strongly eruptive territory which extends towards the East," cited by Dr. Stelzner—Chap. VII—when speaking of the insular mountains of the pampa. In that Chapter it is said, that the Tertiary-formation near the Pa-

raná consists of alternate strata of loose-sand, course sand-stone, calcareous-stone and marl, all of which enclose characteristic petrifactions in a magnificent state of preservation; they are the same as those found every where in the Patagonian tertiary-formation from Bahia-Blanca to Punta-Arenas. In reference to the petrographic character of these strata, the sand and sand-stone predominate, whilst the lime-stone and marls are found in less quantity. So far as regards the petrifactions, Messrs. Heusser and Claraz inform us that notwithstanding their active and long searches and investigations, they have not succeeded in discovering one single characteristic petrifaction in the Tertiary-formation, between Bahia-Blanca and Chubut.

Nor have other collectors like Sr. Piedra Buena, already mentioned—who has brought to Buenos-Aires from Patagonia many objects of Natural History—had any better success. In the same case we find the missionaries Schmidt and Hunziker, who long accompanied the Indians of the South in their migrations; nor does Musters speak of any such petrifications, and we cannot as yet say whether Sr. Moreno—who lately made a bold trip across Patagonia to the Cordillera—discovered any, because the scientific results of his explorations have not yet been published. It is however, of high scientific interest to know that *diamonds are to be found in Patagonia.* Among various classes of quartz and eruptive stones of modern formation; *i.e.*, basalts, pumice-stones and magnetic iron-stones, in all respects the same as those that present themselves between the rivers Negro and Chubut, and which were remitted to Buenos-Aires by Sr. Piedra Buena, Messrs. Heusser and Claraz found two diamonds, one of them octahedral-sided but somewhat rounded, as this stone is frequently found. *

If there be no mistification about this for the purpose of giving the rights of citizenship to an African or Brazilian diamond as is believed, Messrs. Heusser and Claraz, who know Sr. Piedra Buena to be a trust-worthy person that has only navigated the coasts of Patagonia and never travelled in Africa or Brazil; if there be no mistification we say, the mother-bed of these diamonds ought to be sought for in the Patagonian sand-stone. It is probable that this discovery did not surprize Messrs. Heusser and Claraz as much as it has our readers, for, during the first voyage they made over the pampas of Buenos-Aires and Patagonia, the similarity of the physical formation and petrographical character of this region with Brazil, attracted their attention, because the sterile high-

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* We leave all the responsibility of this assertion to Messrs. Heusser and Claraz, not without saying however, that they have made special studies upon the diamond-beds in Brazil, and published the results of their investigations in the journal of the German Geographical Society, Berlin, 1859.

plains of Patagonia correspond to the equally infertile *chapadas* —diamantiferous fields—of Brazil, and the fertile fields adjacent, to the fruitful mountain-region of the sierra of the littoral. *

It is true that the petrographic constitution of the soil of the *chapadas* is richer and more abundant than that of Patagonia; but among the petrean species of the *chapadas* one is found—the itacolumnar slate—which is a very rough-rock as sterile as that of Patagonia, and from which the diamonds are extracted. Should posterior search confirm the existence of diamonds in the Patagonian-formation, the presence of this precious stone would be probable over a great extent of Argentine territory. The Patagonian tertiary-formation is little known, as we have already said, and if the comparison of the vegetation of this district with that of the *chapadas*, rests on a sure foundation, it is probable that the unanswered question put in Chap. VII, whether in a botanical sense the formation of the "Monte" ought not to be confounded with the Patagonian-formation, must be resolved in the affirmative. In this case, it would not be far from the truth in a geological sense, to determine the limits of the Pampean and Patagonian formations, more or less by the presence of thickets and groves.

We intentionally said at the beginning of this topic, that the discovery of these diamonds has a *scientific* interest; and intentionally also, we have not spoken of *practical* interests—of the great wealth which might be obtained by the first diamond-hunters. In effect, if any one without farther knowledge, or awaiting further discoveries to confirm the abundant existence of diamonds in Patagonia, should throw himself into the middle of these wastes in search of the precious-stone, he would probably lose both his time and his money; and if, notwithstanding this warning, he still

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* It may be that the comparison of the almost-woodless pampas with the forest-region of the coast-sierra of Brazil, seems preposterous; but it is not so in this case, where only the petrographic character of both is considered. It is the mission of the botanist to investigate why the woods are wanting to the pampa, and the cause may be found, perhaps, in this very comparison which if exact, takes with it per force the recent age of the pampas. This comparison agrees with what Dr. Stelzner affirms in Chap. VI, where he says that the principal material of the Pampean-formation comes from the Brazilian regions of gneiss and granite; by this he refers at the same time to the energetic decomposition into sandy-mud of the old cristalline-stones, which may so palpably be observed in the neighborhood of Rio de Janeiro and Minas-Geraes. It was whilst under the impression of this energetic decomposition of the stones in tropical climates, that Messrs. Heusser and Claraz came from Brazil to Buenos-Aires, and in their essay already mentioned upon the real diamantiferous beds, they say literally, "The great dispersion of the pseudomorphus crystals, as well as the circumstance that all minerals belong to this category, appear to explain to us very clearly, the continual process of chemical decomposition to which the spars are also exposed."

wishes to tempt fortune, we desire to call his attention to the fact, that even in the most abundant *diamantiferous* districts of Brazil, those persons who dedicate themselves to planting corn and other products to feed the miners, are far richer than they.

In Chap. VII, we have already spoken of the difference between the vegetation and fertility of the pampas and Patagonia; yet, judging from all that is at present known of these botanical considerations, we can assert that Patagonia is fit for agricultural purposes—and therefore for immigrants—only in its depressions and fluvial vallies. The valley of the Negro river is especially appropriate, because it possesses great fertility throughout quite a wide margin, which extends almost to its very sources. The celebrated forests of *conifera* and apple-trees—the Paradise of the Indians—are found up there, and lower down, the powerful river with its periodical inundations, provides sufficient humidity over a valley of one-and-a-half-leagues wide, thus guaranteeing its fertility.

On the other hand, the Colorado river does not—properly speaking—form a valley, except throughout some 15 leagues of its lower course above its mouth in the Ocean. Beyond this, its channel is nothing more than an open fissure in the high-lands of Patagonia. From the point where the formation of the valley commences, it widens more and more down to the sea and its vegetation is more rich and abundant than that found anywhere else throughout Patagonia, although owing to its small longitudinal extension, its importance cannot be compared with that of the valley of the river Negro.

Similar to the Colorado, the river Chubut is only worthy of the name near its mouth, because above this it is nothing else than a mean narrow-canal. It may be added that the valley of the Chubut is not nearly so fertile as that of the Colorado, but on the contrary, it is—like many of the Patagonian depressions—quite saliniferous. Therefore the lands occupied by the "colony" of Chubut being of quite an inferior quality, and it being impossible to extend them to any great degree, the assertion which we have already made that this settlement will not probably reach a condition of real prosperity, is well founded. We ought to mention here, that the Government of Buenos-Aires offered some years ago at its own expense to transport the inhabitants to much better lands, an offer which they declined, as they appear to be content with their lot.

So far as regards the rivers Deseado and Santa-Cruz they possess yet more unfavorable conditions in reference to climate and sterility, which increase towards the South. It may be declared therefore, that the valley of the river Negro is the only part of all the territory of Patagonia as yet explored, which is fit for

European immigration, * because it is seductive to the husbandman to whom it presents a soil very appropriate for the cultivation of European productions, especially the vine and wheat.

Finally, we ought also to mention as of importance to the National economy, that, throughout the whole coast the seal-fishery—for the purpose of the oil—as also the guano, promise large and secure gains to those who understand the business, and are provided with the necessary means. Salt-gathering from the large lagunes near the coast could also be converted into an important trade.

We have not mentioned the Tierra del Fuego, an Argentine possession which is generally considered as a part of Patagonian territory, because we do not possess any reliable data about it; moreover, it is—at least at present—of secondary importance.

Although we have already repeatedly made all necessary reservations relative to the general map of the Republic which accompanies this book, we must nevertheless, make here an important rectification about our limits which it lays down in the Straits of Magellan, because it places the peninsula of Brunswick outside of them, although it belongs to the Argentine Republic; notwithstanding Chile attempted to found a colony there, but the Argentine Government energetically protested at the time against the Chilean advance, thus maintaining its rights well established upon this point.

To explain this error in the map—and others which may be found—it is sufficient to say, that only 40 days were allowed for its construction; it was therefore, impossible to properly consult the archives, inasmuch as no other authorities then existed, the subsequent work of Dr. Quesada not having been published at the time.

The Malvina or Falkland-islands, belong to Patagonia, although England is in possession of them since 1833, notwithstanding the rights of the legal owner. Nor is it only as the hereditary successor of Spain that the Argentine Republic bases its claim to dominion over these Isles; she was in full possession of them, when, on Jan. 3d. 1833, the English war-vessel *Clio*, hoisted the English flag in Port Ruiz—also called Port Soledad—thus overthrowing the Argentine authorities. It is true that England claimed this dominion over these islands after the fall of the Spaniards; but she herself recognized the nullity of her pretensions by the fact, that in consequence of a protest from Spain against an expedition which she had prepared against them, it was suspended, and when the Argentine Republic had conquered its independence and

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* The greater part of the beautiful, though small, district, at the mouth of the river Colorado, has already become private property.

assumed the rights of possession over the territories which belonged to the Spanish domain, she made no objection whatever to recognize the young Republic in full form, without any reservation respecting the Falkland-islands.

The United States of America also explicitly recognized the rights of possession of the Republic over these islands, for a conflict having occurred between the Argentine authorities and some American sealers, the affair was arranged by the diplomacy of the two countries; a palpable proof that the Government of Washington recognized the Argentine Republic as a party in the question.

Without any previous notification, and solely by virtue of an order of the commander of H.B.M. Naval Forces on the South American station, the *Clio* took possession of Argentine property; well knowing that the young Republic was engaged in civil war, and was not in a conditiou to repel force by force. The Argentine Government could only protest in due form, which was done at once, and the protest was delivered to the English Representative in Buenos-Aires. Some months afterwards, it was repeated by the Argentine Envoy to the British Government in London, and although it has produced no practical consequences, it has nevertheless served to protect our rights. The Malvina, or Falkland-islands, are therefore, Argentine property which England has appropriated and still keeps under her dominion, contrary to all law and right. *

II. Territory of the Pampa.

The exterior-pampa, *i.e.*, that great zone which extends from the West of the Province of Buenos-Aires to the Andes, and in which the Southern boundaries of the Provinces of Córdoba, San Luiz and Mendoza, are lost, this great region we say, is as yet less known than Patagonia itself. According to the Census it has a superficial area of 496,880 square kilometres. Dr. Burmeister gives it 6000 German-geographical square-leagues, whilst the planometrical measurement of Perthes has 9,032. We must state however, that so long as the boundaries of each one of the frontier Provinces with this territory have not been determined, all calculation about its extent is wanting in exactitude.

All that is known about the quality of the soil only justifies the general remark, that it is not—at least in part—very favorable for cultivation. Nevertheless, inasmuch as the Indian tribes which inhabit it are for the most part sedentary, it may be supposed that there are districts which are fit for the breeding of cattle and for agriculture, although it is positively known that there are large regions which are only composed of stony and salinous de-

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* See Quesada *La Patagonia y las Tierras Australes.*

serts. When in the future, there may be a greater density of population in the Argentine Republic, and therefore a greater demand for lands, doubtless the pampa will be used for agricultural purposes. Then the numerous currents of water which rise in the Cordillera and are uselessly lost in depressions and salt-lagunes, either by natural or artificial channels will be used for irrigation, thus carrying fertility to large regions purely deserts at present. At first it will be necessary to limit all endeavor to the creation of artificial oases, or the preparing of agricultural places of rest and succor to the march of progress across the desert. Such an undertaking would not be costly nor difficult, because, no where is there greater facility for making artificial-wells than in these plains, where aqueous strata are found in many parts of the pampa at the depth of a few feet.

The territory of the pampa is separated on our map into various sub-divisions, based upon the report of a special Commission appointed by the Senate to present a bill upon inter-provincial boundaries; as yet, however, those of the territories of Limai, Chubut, Rio Negro, etc. do not exist. We refer to Chap. XXIII for an account of all we know respecting the Indian population of this great plain, whilst the reader can form an idea of the configuration of the soil of the exterior-pampa, from the accompanying special and excellent map, the first ever published of this *terra incognita*.

III. Gran-Chaco.

It is not alone from its great extent, but also on account of the most extreme fertility of the soil and its productions of all kinds, that the plain extending from the Paraná to Bolivia, and separated on the East from Paraguay by the river of the same name, is the most valuable of all the federal Territories of the Argentine Republic. The Census gives it a superficial area of 621,000 square-kilometres, which Dr. Burmeister reduces to 5,400 German-geographical square-leagues, whilst the planometrical measurement frequently mentioned above, calculates it at 6,500. But it is proper to observe in treating upon this territory, that its limits have not been fixed with the neighboring provinces as yet, and therefore, its real area cannot be determined.

The river Vermejo divides the Chaco in two almost equal parts, the Chaco-Austral and the Chaco-Boreal. The last extends to 20° S. Lat. and bounds on the North with the Bolivian province of Chiquitos; on the East, it is bounded by Paraguay, and on the South by the Vermejo; on the West, it meets the territory of the Province of Tarija in Bolivia, and the Department of Orán belonging to the Province of Salta. These extensive regions, adminis-

tered by a Governor named directly by the National Government, whose seat is the Villa-Occidental, have latterly made notable progress in population, which has however, generally been confined to the neighborhood of the said town, because the interior of this territory has not yet been explored. The Government pays particular attention to the duty of conquering these fertile regions to civilization. Continual expeditions are made to the interior for the purpose of convincing the Indians that they are no longer the masters, as also to study the topography of the country, thus opening the road to a more sistematic explotation of its riches. The preparatory studies have been made for a cart-road from the Villa-Occidental to Corrientes; and the idea is again entertained of constructing a rail-road from this town to Bolivia across the Chaco. *

The Chaco-Boreal is composed of an uninterrupted plain, elevated 400 feet above the level of the sea. Exposed in parts to inundations, it is divided into the most beautiful groves and fields, as if made on purpose for the raising of cattle. Frequent rains principally during the Spring, Autumn and Winter, mitigate the rigors of its highly healthful but tropical climate. The soil is composed of a stratum of humus some five feet in depth, resting upon a highly-ferruginous marlacious-clay. It is perfectly adapted to the cultivation of the sugar-cane, tobacco, rice, cotton, saffron, coffee, pea-nuts, etc.; fine fruit-trees also give most brilliant results in this region. As yet nothing can be positively affirmed regarding vine-culture, as the experiments already made are too recent; but it appears beyond doubt that it will also produce excellent results here, inasmuch as the stocks already planted have grown rapidly, and produce a sweet and lucious grape.

The principal rivers of the Chaco-Boreal are the Vermejo, which separates it from the Chaco-Austral, and the Pilcomayo which rises in the mountains around Potosí, and after a course of hundreds of miles forms a delta in front of the capital of Paraguay, where it empties into the river Paraguay.

It is supposed with sufficient reason, that the Pilcomayo is navigable to within—or at least very near to—the territory of Bolivia; a presumption which has been strengthened by the exploration lately made by order of the Argentine Government, when it was ascended 60 maritime miles above its mouth, always carrying an almost constant depth of 30 feet, and a current of 4 marine miles per hour. This leads to the supposition that there is a considerable mass of water, inasmuch as the river has no fall in its lower course worthy of mention. An expedition well-equipped by

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* This idea was originated by Mr. Edward Augustus Hopkins, a citizen of the United States, well-known for his various enterprises in these countries.

the Argentine authorities, would soon examine the whole course of the river, and doubtless, it would result that this river presents no other difficulty to navigation than the fallen-trees accumulated during centuries, which could be removed with great facility.

The river Confuso is less important, although many persons—among them Martin de Moussy—consider it to be one of the mouths of the Pilcomayo; without however, adducing any proof of this assertion. It empties very near the Villa-Occidental, and the energetic Governor, Col. Uriburú, has already sent several expeditions even as far as 30 leagues up it, without having been able to settle the question.

Some 30,000 Indians, divided into many separate tribes for the most part in mutual war with each other, inhabit the as-yet-unexplored interior of the Chaco-Boreal, whilst the Christian population which lives around the Villa-Occidental, may be taken at only 3000 souls. In view of the great extent of the Territory, this is but an insignificant number, yet it must not be forgotten that the Argentine Republic only recently commenced to people it; because Paraguay formerly exercised an illegal jurisdiction which although always protested, shut us out from the greater part of it. Only after the fall of Lopez II, the tyrant of that country, our Government sent a small garrison to the Villa-Occidental, which is situated in about 57° 30' W. Long. Greenw. and 25° 10' S. Lat., and then contained only a dozen or more of inhabitants. The civil administration is of yet more recent origin, and the increase of the population only commenced after its establishment. At a former epoch Lopez I, of Paraguay, attempted to establish European immigrants there, and in reality founded on the same site a place called *Nuevo-Burdeos—ang.* New Bordeaux—with Frenchmen, but it soon came to an end on account of the tyrannical proceedings of the Paraguayan authorities. When the Argentine Republic finally entered upon its rightful possession it found no really civilized population, where the Villa-Occidental has now been converted into a rapidly-progressing village, which supports a newspaper among about 1000 souls. Two other centers were founded also, called *New San Marino*, and *Piquete*, which already count 100 inhabitants each, and the *estancias* and farms daily increase in number.

Some industrial establishments of more or less importance have likewise been undertaken, principally such as are engaged in the explotation of the valuable timber which abounds in the forests. Finally, the beneficent consequences which the Argentine administration has brought with it, are not only justified by anticipation, but they are guarantied by the fact that under it, the Chaco-Boreal will cease to be useless to humanity, and will most amply contribute to its welfare.

The Austral—or Southern—Chaco lies between the Vermejo on the North, the Paraná on the East, the Province of Santa-Fé on the South, and the river Salado on the West; on the N.West its boundaries are Salta, and the Western water-sheds of the sierras of Alumbre and Santa-Bárbara in Jujuí; it thus forms a triangle. This half of the Gran-Chaco which is also completely level, is not less richly endowed by Nature than the Chaco-Boreal, to which must be added, that it is of far greater importance to the Republic, because the mother "colonies" are already founded here from which not only must the Northern-Chaco be conquered, but also some parts of the neighboring Provinces. Situated as it is on the the right bank of the Paraná in front of the Province of Corrientes, it is difficult to understand why its settlement was deferred until quite recently, because no other Federal territory presents such appropriate places for the purpose. Respecting this, the opinion of a high Argentine officer, now many years dead, was very significant, especially inasmuch, as he had entered into service at the time of the revolution against the Spanish-rule and had many opportunities of traveling along the shores of the Chaco during his youth. "Our fathers," he said, "who founded their towns on sites totally unfit for the purpose, and left to the possession of the Indians such regions as the shores of the Paraná and the Vermejo which present so many advantages, were absolutely stupid."

As we have already said, it is only lately that a rational method of settlement has been commenced in the Chaco-Austral; because, if it is indeed true that some attempts were formerly made to found some agricultural-establishments with European immigrants, they were wanting from the beginning in the principal elements of success. They were only private speculations, whose managers without exception, were destitute of the necessary means to carry them out, and had no other end in view save the desire to acquire large amounts of land, by simply peopling the portion prescribed in the law of concession. They took little care of the welfare of their people, because the immigrants were only a means of enabling them to gain their ends. It is not therefore, to be wondered at that such enterprises came to a deplorable end, although it is worthy of mention that none of the "colonists" who were deceived in their hopes, ever complained of the country or of the fertility of the soil in their respective settlements, but all agreed that they would have rapidly reached a flourishing state, had they been properly directed. With such antecedents full faith may be placed in the results which the settlement of these regions under the immediate direction of the State, may produce; and it is to be hoped that the present generation will efface the errors of their predecessors, by opening to civilization these immense districts, which offer us such innumerable advantages.

In the time of the Spaniards some attempts were made with partial success, to civilize the numerically-weak Indian population of the Chaco, by means of missions which penetrated the wilderness. The real boundaries of the Provinces were then more advanced in places, than at present. But the war for Independence and the internal disorders consequent upon it, took away too many of the arms-bearing population, or rather, attracted the whole attention of the Argentines, so that the task could neither be continued, nor advantage be taken of the progress made by the Spaniards. Thus, we were obliged in many cases, to retreat before the aggressions of the Chaco-Indians, and yield them lands of which they are as yet absolute masters; this even went so far, that it was dangerous to remain in the outskirts of the capital of Santa-Fé.

The establishment of the *Esperanza* "colony" produced a change in this state of things. In the beginning the "colonists" were compelled to keep guard against their rapacious neighbors, but the plow had to conquer; its furrows became longer and longer, and new "colonies" were founded, advancing towards the North, *i.e.*, more towards the interior of the Chaco; thus, even before the Government extended its frontier-line, the plow had already reconquered hundreds of square-leagues of the best land. At present the stream called the Rey, forms the final boundary between Santa-Fé and the Chaco, and on its borders some "colonies," already flourish, the chief of which bears the significant name of *Reconquista*.

The Province of Corrientes has also latterly attempted to conquer a part of the Chaco, although with little success. To this end it undertook the Spanish system of Missions, and on this very account did not fulfill its object. In front of the populous city of Corrientes on the right bank of the Paraná extends the wilderness, where some tribes of Indians have fixed their dwellings and carry on an active commerce with the city which they provide with fuel, green forrage, etc.; on this account they are more accessible to civilization than their rapacious congeners of the frontiers of Santa-Fé. This induced the Government of Corrientes to found a Mission on the bank of a navigable stream which empties into the Paraná. A chapel was built there, which was handed over to the order of the Franciscans of the city of Corrientes. But it was soon ascertained to be an unfortunate enterprise, because the Indians of our day do not follow the steps of their grandfathers, and are little disposed to be converted into faithful vassals of spiritual pastors. The same results also occur in the two Missions which are maintained in the Salteño-Chaco, notwithstanding the priests have shown the greatest zeal worthy of all eulogy. Nevertheless, it would be a deception to conclude from these experiments, that these Indians are completely inaccessible to civilization; on the contrary, it should be considered as a proved fact

that an attempt to convert them into useful and sedentary inhabitants by means of an adequate system, would give the best results. We have already mentioned that the tribes on the bank of the Paraná hold commercial relations with their Christian neighbors, to which we must add that the plantations of sugar-cane in Salta and Jujuí, are exclusively worked by Indian-laborers. At harvest time whole tribes come from the wilderness and hire themselves on the plantations, where--be they well treated, they become faithful and active laborers. When the crops are gathered they again withdraw to the wilderness, but it is remarkable that latterly the number of families which make their domiciles in the proximity of these plantations, and thus lead a sedentary life, increases every year. Therefore the Chaco-Indian is by no means unfit for civilization although it is doubtful whether the Missions are sufficient definitely to attract him to it.

The Indians of the Chaco-Austral are weak in number, being only calculated at 15,000. These are divided into numerous tribes which cordially detest each other. Some of them attempt the raising of cattle, but the thick virgin-forests which extend over the territory, have prevented their becoming good horsemen like their brethren of the pampa; but they find ample hiding-places among the woods and swampy-places—which can only be discovered by experienced guides—where they retire in security against the persecutions of the frontier-soldier, in return for their raids upon the settlements; these are always made by small groups of Indians which hold no comparison with the pampa-Indians.

The Chaco-Austral besides its beautiful virgin-forests, has also magnificent natural-meads, and the breeding of cattle—principally horned—produces far better results than in the *estancias* of the littoral. The very extent of this territory necessarily implies a great variety of soil, and although only narrow strips along the shores of the Vermejo are known as yet—and these but very superficially—certain points are ascertained to be swampy and others sterile. It appears that the streams which empty into the Paraná are not navigable far above their mouths; but there are many lagunes some of fresh, and others of salt water. The same productions as those of the Province of Corrientes – to which naturally, some others must be added—grow magnificently in the riparian districts, which are already the most important, because future explorations as well as the settlement of the whole territory, must start from them. The regions of Salta contain the fittest soil for inter-tropical productions. The cultivation of indigo which grows wild there, promises brilliant returns; that of saffron will also probably greatly increase, because the first essays have produced two quintals of the flower for each square sowed; whilst here and there the cactus-nopal abounds, covered with the valuable Cochineal. In a word it is a

land of blessings, which aside from the young-settlements which have been recently founded under the name of "colonies," produces no more utility to the country than the quite flourishing timber-cutting establishments on the banks of the river Paraná. All this however, will have changed within a few years, and then millions of active and contented cultivators will draw most abundant harvests from the fertile soil.

It is interesting to science to hear that in former times gigantic masses of meteoric-iron fell in the Chaco, which unfortunately are so far interned in the Territory, in a region called *the Field of Heaven*, that no thorough investigation as yet has been made regarding them.

IV. Territory of the Misiones.

This Territory is formed by that part of the extinct empire of the Jesuits—the wonderful creation which displayed the inalterable perseverance with which the Company of Jesús pursues its objects which was inherited by the Argentine Republic. A retrospective view of the origin, extent, and ruin of these Missions, would carry us too far, and books are not wanting which treat upon the subject with an upright judgement; the unprejudiced reader can acquire the conviction from them, that although the sudden expulsion of the Jesuits from their own State formed in the Missions, was of advantage to the views of the Spanish Government, it was so great a backsliding to the people directly interested, that even now the doubt exists whether their remains can ever recover from so rude a blow. And we say *remains*, because of the number of 30,000 inhabitants which composed the population of the Missions at the end of the eighteenth century, or 30 years after the expulsion, hardly 3000 exist at present: nor do they form a National community, but have become mingled more or less with the people of the neighboring Correntine districts.

The territory of the Missions forms the N.E. corner of the Argentine Republic. According to the Census its area consists of 62,100 square-kilometres; Dr. Burmeister places it at 700 German-geographical square-leagues, whilst the planometric measurement of Perthes, gives 1114. Its limits are the Province of Corrientes on the South, although this Province pretends to hold jurisdiction over it; on the North and East it is bounded by Brazil, and on the West by the Republic of Paraguay, from which it is separated by the upper-Paraná river. It is most abundantly provided with water-courses. The surface of the country is varied; hills and mountains, large and wide plains, extensive and delicious vallies alternate: in a word, it is a delightful land, as proved by the fact that the Jesuits, to whom no one can deny perspicacity and pre-

vision, had chosen it for their favorite seat, and the center of their dominion in the New World. There is no country in America nor in the whole world, which surpasses the Missions in fertility, and few regions in this respect can even be compared to this part of the Republic. Although the climate is warm, it is not so to the degree of hindering labor in the fields—even that of the Northern European and the territory being surrounded by navigable rivers it has the advantage over many subtropical countries, of a very secure and cheap communication with the chief commercial centers.

In place of mentioning the different articles of cultivation which would give some returns in the Missions, we will only say, that all the inter-tropical products may be harvested there of the best quality. The crops of sugar, cotton, tobacco, mandioca, rice, maize, wheat, beans, etc. etc. amply recompense the few settlers for the small labor the soil requires in regions so highly favored by Nature. The raising of fine fruit-trees will also be of importance in a near future, and the slopes and hights exposed to the sun, present every advantage for the culture of the grape-vine, which, as also must be the case with the silk-culture undertaken with skill, will beyond doubt produce immense results. Among the forest-trees which grow admirably in the Missions, that which produces the Yerba-maté or Paraguay-tea, merits a special mention. Near the river Uruguay it forms extensive forests, which are the source of a most important industry, whose principal center is in the Villa de San Xavier. It has previously been said that the territory of the Missions is also very rich in building-timber of the most valuable kinds; the districts on the Paraná are distinguished, in this respect, where forests of cedar and jacarandá abound among the other trees.

It is beyond doubt that the National Government will undertake the settlement of this Territory; as also, that such a course will produce the grandest consequences, because the Missions possess all that the immigrant can desire; most fertile soil, extraordinarily healthful climate, abundance of water and wood and stone, a secure outlet for the harvests; and finally, in the rivers which surround it a good and cheap means of transportation. The determination of the Government to directly undertake the system of settlement, is not only of importance to the Missions, but also to the other Territories of the Republic, because it is a guarantee against all speculation at the cost of the immigrant, for which reason it has been so undertaken; and it is determined secure to him the entire legitimate-fruit of his activity. Therefore, the Government has resolved that the settlement of its Territories shall not be carried out by means of speculators.

CONCLUSION.

ALMOST all the chapters of the present work were already in the press, when we received the Message in which Dr. Don Nicholas Avellaneda, the President of the Republic, gives an account of the condition of the country to the Representatives of the people. The many and interesting data contained in this document, justify its reproduction here in full. Thus we close the work committed to our charge by the Hon. Central Committee for the Exposition of Philadelphia; yet not without previously soliciting the indulgence of the reader towards the errors and omissions which may be found in this book, and which have originated in great part, not only from the limited time in which it had to be compiled, but also from difficulties of a technical nature.

The Message to Congress is as follows:—*

MESSRS. SENATORS AND DEPUTIES,

You find the Republic in peace as you left it; a lasting peace because based on social interests steadily consolidated, and on public opinion which is stronger to-day than ever heretofore in this country; but you come upon difficult times, and your labors will be varied. Doubtless, you will be equal to the occasion. I salute you with the firm conviction that at the close of this session you will leave the country inspired with greater confidence; public expenditure more methodized, and our institutions more efficacious. Gentlemen, in the discharge of my duty I will give you the following report on the state of the nation:—

Home Politics.

The same policy of equity and toleration which was adopted after the rebellion of September, has been observed by my Government with regard to the Court-martial sentences, which subsequently were duly ratified. The amnesty law was promulgated on the 26th of

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* Translation taken from *The Standard*, a newspaper published in Buenos-Aires, in English. *(Note by Transl.)*

last July, and since then there has not been a single political exile. This amnesty-law was ample and generous, and had but one exception, namely common misdemeanors, which could not be included, and only very few parties come under this exception. A year has now passed, and faithfully interpreting your wishes I declare, I will always extend full amnesty to everyone compromised in the late rebellion who may ask to return to his country, and in due written-form promise to support its government and its laws. In the province of Buenos-Aires there exists a numerous party which, without any motive, abstains from taking any part in politics, and whose conduct is subversive, if we are to believe its newspapers; but this will disappear; opposition is lawful, but only within the boundaries of the Constitution and the law. No opposition party can exist cut off from political life, and I applaud most highly the conduct of the Government of Buenos-Aires in respect to this matter. There must always be a majority and a minority, a ruling and an opposing party; but that party must not be seditious, nor yet the rulers tyrannical. The duty of the National and Provincial Governments after the promulgation of the amnesty law is oblivion, opening up all the easy ways of a new political life; but oblivion is incumbent upon every opposition party, and I hope that these reflections will be received by my fellow citizens in the same patriotic spirit with which they are suggested.

Election Law.

This Congress has just been renewed, and I believe it a good opportunity to revise the election-law, to obtain greater guarantees for the free expression of the public vote, and greater perfection against a repetition of electoral riots. We must suppress the election by a single list, and divide the Provinces into electoral districts according to the deputies they have to elect; this will abolish the frauds and violences which have marked the whole election of one province. In the United States, the election of Deputies is left to the arrangement of each State, but the law of 1842, obliges the States to elect by districts, and the law of 31st March 1870, provides that all votes shall be printed or written. Both laws should be our models; and the American laws of 19th February 1851, and 10th January 1873, define the proofs to be given where an election is disputed. We should never forget that where the public-vote is tampered with, representative institutions exist but in name.

Press Law.

In the additions to the American Constitution and declaration of rights, is the following:— "Congress cannot pass a law establishing a religion, or restricting the right of speech, the

liberty of the press, or the right of meeting in public to demand justice!"

The Argentine Constitution says:—"Congress cannot pass a law restricting the liberty of the press or establishing the national jurisdiction over it." The text of both Constitutions is alike. Ninety years have elapsed since the promulgation of the American Constitution, and during that long epoch, it has never been maintained that sedition or rebellion published in the newspapers, was beyond the national jurisdiction. Nay more; Congress, anxious to protect the authorities against the license of a turbulent-press, passed a law in 1798, to last for four years, to punish all libels against the President and Congress. With such precedents how comes it, that in this country press-libels escape with impunity, and can neither be punished by the judge nor repressed by law. The Constitution has organised a Goverment, and certainly could not wish to destroy the same by organising an antagonistic power of irresponsible writers and demagogues? Congress cannot restrict the liberty of the press; but are sedition and rebellion to come under this category? Every Code from that of Justinian until now, treats press-libel as an injury and a calumny; our Constitution prohibits Congress from legislating on press-matters, but when the abuse of the press attacks public right and national safety, the Tribunals of the country should interfere. You have just seen that the American Constitution prohibits Congress from passing a law against the right of public meeting, but no one has ever sustained that the American Congress could not legislate against rebellion and disaffection. And cannot we legislate, the same as the American Congress, against rebellion in the press and commotion in the streets? Let us do the first to escape the latter. In the Presidential message of 1874, I asked you for a law to repress rebellious writing, and I feel it my duty now to insist upon the great importance of this measure. I do not object to a free criticism of the Government, but all appeals to rebellion and to violence should be prevented, and the Minister of Justice has given instructions to all the Fiscals to take actions at Law against all seditious writers.

Foreign Affairs.

We are on the most friendly footing with all nations, and I am happy to tell you that the long pending questions arising out of the Paraguayan war have been amicably settled; treaties of peace, limits, commerce and navigation, have been signed by the Argentine and Paraguayan Plenipotentiaries; the Minister Plenipotentiary of Brazil acceding to the same. The Paraguayan Government has sanctioned the conduct of its Minister in the negotiations. The treaty will now be submitted to you. The Triple-Alliance treaty

has been the subject of much discussion, but now, after this costly war and severe victory, we have only taken what was always admitted to be our own, and left to arbitration what was in dispute. True to its traditions, the Argentine flag is one of emanciption, not of conquest. And thus terminates the greatest South American war since the struggle for Independence. The last of the soldiers of the Alliance will soon have abandoned for ever, those majestic regions of impenetrable woods. The mystic chains of Jesuitical colonization are shattered; the jealous secrets three successive tyrannies are revealed; and the country is opened-up to commerce and immigration. Paraguay without soldiers and foreign-flags, will be henceforth at the mercy of those tumultuous movements, which South America invariably employs whilst developing her interior prosperity. In overcoming the desert and primitive barbarism, Paraguay will advance, and I express the wish of my country, when I pray that God and Liberty may not forsake her.

You are aware of the last feature of the Chilean question. We answered the Chilean protest against the law establishing a steamer between this port and Patagonia. Since then the Chilean Government has assumed a more conciliatory tone, and we have agreed to leave the question to arbitration, which the Chilean Government has also accepted; possibly the new Chilean Minister, who is now on his way hither, will bring full-powers.

The Banda-Oriental has had many changes of Government, which sprung from domestic agitation. Our Government has maintained a neighborly neutrality. During the great struggle for independence America was a common theater for the heroism of her sons, but that epoch of cosmopolitan patriotism has passed, and I believe that it is good policy for nations so closely united to respect each other; therefore this Government during the Oriental revolution, prohibited the export of arms and munitions, or the departure of revolutionary expeditions, and our Minister has come to an arrangement with the Oriental Government, respecting the conduct of both Governments in times of revolution. We have exchanged treaties of friendship and commerce with Perú, and our Minister in London has signed a postal treaty with England; he is concluding another with Italy. Sr. Dominguez, having left Lima, has been sent as Envoy Extraordinary to Rio de Janeiro, and Dr. Derqui, who was sent Chargé d'Affaires to Paraguay in last November, has lent valuable services towards the conclusion of the Paraguayan Treaty.

Immigration.

In the year 1875, forty-two thousand and sixty immigrants arrived, which is about one-third of the number that arrived in the years 1873 and 1874. Immigration, however, has everywhere declined, and in the United States, the home of immigrants, the arrivals in

1873, reached 369,487; they fell to 208,089 in 1874, and the diminution for the last year is even greater. We have only the returns for the first eight months of 1875 for New-York, which give 63,553 immigrants. The emigration of man is like the movement of capital; it obeys certain rules, and produces in all cases the most inevitable results. The immigrant asks for protection in his adopted country, and to escape from the exactions of privilege and the violence of anarchy. Rebellious and disturbed countries are not the lands for immigration. The immigrant aims to acquire real-estate, and we, the owners of immense territories, have not been wise enough to offer it to him; we must abolish every obstacle that impedes immigration. As yet we have done nothing to bring the strong-laborious-North-of-Europe-emigrant to Buenos-Aires or Rosario, for the same fare that carries him to North America. We have to do all this, and it is a misfortune when immigrants congregate in commercial cities where they are subject to epidemics or commercial crises, which finally compel them to leave the country, as is now the case in Buenos-Aires and New-York. The law proposed to you last year, and which was so favorably received by the European-press, had this in view; but the passing of this law is not sufficient; we must facilitate the acquisition of land for the immigrant—we can waste no further time in determining National limits. The question is, which has the greatest power to people a country? The Nation or the Province? The answer in the United States is, the Nation, owing to its great resources, its authority, and its simple and uniform price for lands, which is the most permanent inducement to immigrants. We can give lands to immigrants without expense, since we own them; but if we wish to help the immigrant and reduce the passage money from the North of Europe we must spend money, which owing to the economy we have adopted, is a serious question enough. If our imports exceed our exports we must economize more, since capital is scarce, and we have to work hard to increase it; but if economy is a sure way out of the present situation, it is also a long one. Let us economize, but let us also increase our produce, so as to establish the balance of trade. The great agent for all this is the immigrant, and happy the land that can secure so powerful an element; its troubles are but temporary, its progress constant. In every branch of public service let us economise, but let us spend money for immigration. I will not refer to the astonishing figures of Prussia in the last century, nor the fabulous history of California, where the sweat of honest-labor has done far more than the richest of its gold mines; I will only show that the most reproductive expenditure of capital is money spent on immigration. In 1870 the colonies of Santa-Fé began to rear their heads, and produced 681,045 arrobas of wheat. In 1875, these colonies produced 2,993,200 arrobas.

In 1870, the export of agricultural produce in Santa-Fé was insignificant, whilst last year it reached 1,351,000 gold-dollars. Under the active direction of the Commissary of Immigration 9,828 immigrants were settled in the fields of Buenos-Aires and throughout the different Provinces, whilst but 3,440 new-comers obtained situations in the city of Buenos-Aires, and herein is a new proof of the grand highway which has been opened for thousands and thousands of our fellow-men, and respecting which further particulars will be found in the report of the Minister of Interior.

The Chubut colony has been re-inforced by 450 more Welsh colonists. The Commissioner is also sending up families to Reconquista, and three other new colonies in the Chaco and on the East Argentine railway. The prize for mulberry-planting has been paid to three settlers at Tortugas.

Financial situation.

We are passing through a crisis, but it is necessary for us to study calmly what is the extent of the crisis, and how far it weighs on national prosperity. We must not lose faith, for the most powerful nations suffer at times from the same causes, without falling into utter ruin. The generic cause of all crises is the want of equilibrium between two kinds of capital, fomented by the daring spirit of entreprise—credit facilities and the prodigious growth of commercial operations—thus where there is the greatest commercial activity, the danger is most imminent. In the great markets of Europe the crisis is periodical say every ten or fifteen years, whilst in New-York it is every five. The fight is between imports and exports, the former representing comfort, the latter labor. Let us look at figures. In spite of the crisis our imports of 1875 have fallen off; they amounted to 55,775,627 dollars, and this compared with 1874, which reached, 55,962,199 dollars, only shows a diminution of 195,500 dollars. It was only in the year 1873, and in the last three months of the year 1872, that the real causes which produced the crisis arose from wild speculation in sterile lands, wanton extravagance, and excessive stocks of goods. Now, if we strike from the record these fatal fifteen months, we find the gradual growth of an industrial people. Our imports in 1875, exceed by 11,500,000 dollars those of 1871, and 8,000,000 those of 1870. Let us now consider the exports: we find that in the year 1875 our exports, which are the true index of our progress and national wealth, reached their highest figure; never before did the inhabitants work so hard, nor were the fruits of their toils so blest by Providence. The value of our exports for 1875 amounted to 50,231,400 dollars, giving an increase over the previous year of 7,226,688 dollars. Our export tables show a steady increase, with the single exception of the year 1874, that of the rebellion. The following are the figures:

1870.....	29	millons.
1871.....	26	„
1872.....	45	„
1873.....	45	„
1874.....	43	„
1875.....	50	„

There is therefore a difference for the year 1875 between imports and exports of 5,434,227 dollars in favor of imports; but we all know that the difference can be accounted for by the Custom House valuations, which are remarkably low on our exports, whilst they are high on our imports: we may therefore safely say that the accounts balance. There is no truer guide for this country than these import and export tables, since the Argentíne Republic only exports raw produce for manufacturing countries, whilst she consumes only articles manufactured abroad.

When we study patiently these figures it is unnecessary to make any farther comments, since as our produce increases and our consumption does not do so, it is irrefutably proved that the Nation, in spite of the crisis, is not becoming impoverished; not only is the growth of our industries untouched, but within the last six years it has doubled; our exports are ample to pay for our imports, and there is no room for any gloomy forebodings.

Revenue and Expenditure.

The revenue of 1875, amounted to 17,206,746 gold-dollars, being an increase of 675,859 dollars, over that of 1874. The Customs' duties were—

Import duties	$	12,512,878
Export „	„	2,303,029

The Post-office receipts increased 40,000 dollars and the expenses in this department were reduced 100,000 dollars during the year. There is also an increase of revenue in the Telegraph Department and in the sale of Stamps. The formation of new Custom-houses on the seaboard of Buenos-Aires has produced wonderful results, and led to a corresponding increase of trade in such localities. Among these new ports we note the Custom-duties have been—

Ajó.....	$	75,578
Ensenada...	„	40,913
San Pedro..	„	73,952
Zarate	„	22,196

Besides the above there are new ports opened at Bahia-Blanca and Baradero.

Public expenditure has been cut down in many items. Thus the Budget as voted by Congress for the current year was based on an outlay of 21,428,690 dollars, and we have cut this down

to 17,428,790 dollars, say 220,000 dollars over last year revenue. This of course does not include the outlay on Railways and other Public-Works, paid for out of the London loan, nor sums payable on account of the rebellion of 1874, and balances due for arms and ironclads ordered by my predecessor.

The Finance report and the Budget for next year, to be shortly presented to you, will put our finances on an entirely new footing. The decree of February 15th has suspended all extras not voted in the last Budget.

In the many reductions of expenditure, we have studied not to injure the working of any branch of the public-service, but to check the *empleomania* which has become a social evil. We have also reduced the subsidies to Provinces, as it is now time for each Province to bear its own burthen, and leave the Nation only responsible for itself.

For some years back the expenditure has been in excess of revenue, and deficit accumulating upon deficit, has caused a burthen to the exchequer often delaying payment of urgent calls. In the new arrangement of our finances this difficulty will be entirely obviated.

The want of a monetary system on a fixed standard, is a matter to call for your prompt consideration, as the fluctuations in coin have led to serious inconveniences in some of our Provinces.

Railways and Public-Works.

So preoccupied are men minds with the crisis and the passions of party strife that no one thinks for a moment of railways, yet never was the spread of such enterprises greater than at present.

The second section of the Andine-line was opened to the public last October.

The last station is at the old frontier-fort of Villa-Mercedes. This line measures two hundred and fifty-five kilometres, and is the property of the Nation.

The Córdoba and Tucumán line suffered much from the heavy rains, but was never interrupted a single day. There are already 416 kilometres open to traffic. The materials for the rest are on the spot, and ere you will have closed your sessions the locomotive will have entered the historic and beauteous city of Tucumán.

The Primer-Entreriano has been almost re-made from the extra material of the Tucumán line.

The Campana line, just opened, is 76 kilometres long, and enjoys a national guarantee.

Nor have the Provincial authorities been behind-hand. The Great Southern extension to Azúl is all but finished, whilst the long-talked-of branch to Bragado from Chivilcoy, is at length begun.

The returns of the Central-Argentine for 1875, exceeded the 7

per cent. guaranteed by 160,000 dollars, which has been paid into the Treasury. The increase of traffic is worthy of note. In 1874 it carried 78,000 tons cargo, whilst last year it exceeded 113,000.

Of the several public-works on hand, I can now make only passing mention, refering you for further particulars to the ministerial reports.

The Rosario Custom-officers and the Buenos-Airean Port-captain, were recently installed in their new spacious quarters.

The first section of the February-Park has been finished, and handed over to the Provincial Government.

The Santa-Fé port-works are finished, and their efficacy is shewn by the manner in which they resisted the recent floods.

The important bridges "Pasage" in Salta, and "Sali" in Tucumán, were repaired from the foundations. Seven of the National Colleges have undergone important repairs.

The submarine-cable to Martin-Garcia was inaugurated last September, and has since lent valuable services to navigation.

The Arsenal in Zárate grows rapidly, and the defences of Martin-Garcia will soon be finished. An extensive chart has been made by the Chief of the Torpedo department.

The Minister of Finance invited the celebrated English engineer Mr. Hawkshaw, to come over here for the purpose of studying the port-question; meantime, an arrangement has been entered into with the Provincial Government for the enlargement of the Boca.

The Military Telegraphs authorised by you last year, are not done, but the materials have arrived from Europe. The Great Southern Railway consented to our putting a wire on their posts as far as Azúl, whence it will be carried to Fort Lavalle. Before three months every fort on the frontier will be in instantaneous communication with the War-office.

Popular Education—Exhibition of Argentine Products.

Popular Education is a subject of vital importance to a free and laborious people, since labor to be productive must be intelligent, and unless well taught, the people are liable to fall easy victims to bad Government.

Popular Education is making vast strides as shewn by the school-census just taken in this and the neighboring provinces of Santa-Fé, Tucumán, Rioja and Salta. Between public and private, the number of schools in 1875, exceeds by more than eighty those of 1874. They are attended by 120,000 children, thereby giving us the palm in proportion to our population, over all the other countries of South America.

The Normal school of Tucumán has opened its classes. That of Paraná has already sent forth its first set of teachers.

In the National college of Rosario, a school of commerce has

been opened, and normal classes have been added to the colleges of Corrientes, San Luis and Santiago-del-Estero. These normal schools count 5000 pupils; the scientific instruments, books etc. cost the Nation forty-five thousand dollars. Nevertheless the progress of learning is very slow, and does not at all keep pace with the increase of population. This is due in a great measure to immigration; two-thirds of those arriving from the Old-World know not how to read.

On 12th December last, the preliminary exhibition of the articles for Philadelphia opened in this city. It was the largest and most minute ever yet attempted in this country, and cannot fail to succeed, being under the auspices of the Great American Republic. Two great and lasting works remain to attest the labors of the Committee; viz., the most complete and correct map yet published of the Republic, and a voluminous book called the *República Argentina*, now being printed in four languages.

The Army.

The reorganization of the army was a matter of considerable difficulty; preferring the voluntary to the conscript system, we created enlistment-offices under the command of popular chiefs. The result could not be more satisfacfory. We have now an army of 8,000 men, all natives. Criminals are excluded for the sake of public morality and military honor.

Expedition to the Wilderness.

Latest telegrams from the expeditionary forces are most satisfactory; the new frontier line takes in 2,000 square-leagues more of land, hitherto in the power of the Indians. All the strategic points are now occupied: Col. Nelson's command is at Withalobos; Col. Villegas's at Trenquelauquen; Col. Freyre's at Laguna del Monte; while the great Indian headquarters of Car-huel, has been seized by the Minister of War in person. At the same time Gen. Roca sends word from Córdoba that he has pushed forward his line of forts in communication with Withalobos, thus making the line continuous from fort Sarmiento on Rio Quinto, to Bahia-Blanca. The new line is one-third shorter than the old one, although 30 leagues further out. The Minister of War has been ably seconded by the Governor of Buenos-Aires in carrying out the purposes of the expedition. Before long the benefits resulting therefrom will be evident, especially when it is found that the new line of frontier can be maintained without great trouble, Minister Alsina will arrange everything before his return to Buenos-Aires.

Messrs. Senators and Deputies: In conclusion I must observe that peace prevails throughout the Republic, and although the mercantile crisis continues, the wealth of the country and its productive

power are yearly growing by millions. The knotty qnestions with some of our neighbors, no longer cause alarm; some have been amicably settled, and the others are in a fair way to be so. It is true that immigration has fallen off, but the same is remarked in other paris of the world also.

Our public expenditure was too great; hence we have cut it down as far as prudent economy suggests, without stopping any of the great public-works so necessary for the development of our national industries and resources. Stock speculators—aided by some second-class newspapers in London—have caused a notable decline in Argentine stocks. For 30 years the Buenos-Aires Bonds were unpaid during the tyranny of Rosas, but immediately on his expulsion, the Buenos-Aires Government sent a Commissioner to England to make good its obligations. The holders of the Bonds expressed their contentment at the promise of payment in future, but Buenos-Aires did more; she paid up 30 years back-interest and sinking fund, with deferred 3 per cent stock. Perhaps no other country has ever acted with greater honesty, and hence we may hold our heads high before the world.

On December 31st 1875, our Foreign-Debt amounted to 43 million dollars in bonds (including £1,200,000 held for us by a London banker). The whole foreign debt is covered by the railways to Tucumán, Rio-Quinto and others, besides the vast net of telegraphs all over the Confederation, and the many public-buildings, such as the Rosario Custom-house, all made within the last 3 years. It is true that we have lost money in the civil wars of the last 30 years, but the principles of freedom often cost great labors; in England, the wars of the Roses lasted over a century.

Holders of Argentine-Bonds may make their minds easy. No matter what division of parties at home, we have but one name, one flag, one honor as regards foreign countries. We are 2 millions of Argentines, ready to endure hunger and thirst, rather than suffer our coupons to go unpaid for 24 hours.

You have now, Messrs. Senators and Deputies, an exact statement of the condition of the Republic. Let me hope Divine Providence will inspire your resolutions in the present sessions of Congress, which I now declare open.

N. Avellaneda.

STATISTICS

OF THE

FOREIGN COMMERCE

OF THE

ARGENTINE REPUBLIC

TOTAL VALUE OF IMPORTS DURING FIVE YEARS

IMPORTED FROM	1870	1871
Belgium	1166354	1688013
Bolivia (by land)	193048	95102
Brazil	3357499	2550098
Chile (by land and water)	1369772	1658578
East-Indies	256243	202583
England	12911151	14537010
France	12757236	6763822
Germany	1574572	1180132
Holland	1297763	1243829
Italy	1685164	2297188
Paraguay	153589	498525
Perú (by land)	112	—
Portugal	23134	52257
Spain	2179384	1596142
United States	2862338	2067275
Uruguay	2100011	3478346
West-Indies	216364	246928
Other countries	46205	126787
	44269837	40282615
In Transit	3270111	3874643
Total imports	47539948	44157258

FROM 1870 TO 1874 INCLUSIVE, IN HARD DOLLARS.

1872	1873	1874	1870-1874
2406812	2967586	1910435	10139200
111713	81194	71486	552543
3268538	2968953	2651388	14796476
1257202	1444182	1257817	6987551
291783	377397	535573	1468045
16316066	19344143	16227806	79336176
13103622	18255138	12275342	63155160
1822111	3228015	2304001	10108831
1453051	1611616	1129630	6735889
2861493	3784384	2620656	13248285
722422	839881	971041	3185958
300	445	—	857
76346	138379	126827	4166943
2876097	2952600	2716723	12320946
3205944	5167616	3949584	17252757
4214333	2735299	3327856	15855845
291783	377397	335573	1468045
351290	310724	33724	872730
54635344	66458873	52187903	257834572
4963799	4606326	3773274	20488153
59599143	71065199	55961177	278322725

TOTAL VALUE OF EXPORTS DURING FIVE YEARS

DESTINATION.	1870	1871
Belgium	6537335	6145390
Bolivia (by land)	250642	246826
Brazil	603021	574091
Chile (by land and water)	1639261	2119315
East-Indies	827784	6102941
England	6926632	103699
France	5493025	2707411
Germany	225809	57459
Holland	139679	564
Italy	—	376052
Paraguay	884791	677775
Peru	313424	64462
Portugal	34400	23146
Spain	7623	13910
United States	816708	934961
Uruguay	3827530	3709359
West-Indies	466184	1566335
Other countries	160939	451825
	29154825	25875521
In Transit	93321	250416
Total	29248146	26125937

FROM 1870 TO 1874 INCLUSIVE, IN HARD DOLLARS.

1872	1873	1874	1870-1874
12795101	13891508	14866626	54235960
219957	470670	529848	1717943
985127	769464	602119	3533822
1701201	2370195	2326257	10156229
617	—	—	1181
9215062	9894007	5187017	37325659
8270952	8677819	7560895	32720102
649576	449597	769151	2197832
65286	226204	24149	512777
1316973	1487925	1648158	6015622
299106	342846	564006	1583844
28806	66508	41362	194222
55418	72884	42872	192707
1741403	1226977	1531830	6251879
1780661	992510	1854378	6660068
4312355	3032945	3747300	18629489
1118996	678602	428718	3429952
314012	471444	200809	1599029
44870609	45122105	41916495	186939555
872583	747209	1188217	3151746
45743192	45869314	43104712	190091301

TOTAL VALUE OF IMPORTS AND EXPORTS DURING

COUNTRIES.	1870	1871
Belgium	7811689	7833403
Bolivia (by land)	443690	341928
Brazil	3960520	3124189
Chile (by land and water)	3009033	3777893
East-Indies	256243	203147
England	19837783	20639951
France	18250260	9471233
Germany	1800381	1283831
Holland	1437442	1301288
Italy	2569955	2974963
Paraguay	467013	562987
Perú (by land)	34512	23146
Portugal	30757	66167
Spain	2996092	2531103
Uruguay	6689868	5044681
United States	2566195	622980
West-Indies	1044148	5776634
Other countries	207144	578612
	73424662	66158136
In Transit	3363432	4125059
Total imports	76788094	70283195

FIVE YEARS, FROM 1870 TO 1874 INCLUSIVE.

1872	1873	1874	1870-1874
15201913	16859094	16777061	64483160
331670	551864	601334	2270486
4253665	3738417	3253507	18330298
2958403	3814377	3584074	17143780
296838	251321	278614	1286163
25531128	29238150	21405823	116652835
21374574	26932957	19836237	95865261
2471687	3677612	3073152	12306663
1518337	1837820	1153779	7248666
4178466	5272309	4268214	1926907
1021528	1182727	1535047	5769302
29106	66953	41362	195079
131764	211263	169699	609650
4617500	4179577	4248553	18572825
7518299	8200561	7696884	35882246
5994994	3727809	5182234	22515913
1410779	1055999	764291	4898197
665302	782168	234533	2467759
99505953	111580978	94104398	444774127
5836382	5353535	4961491	23639899
105342335	116934513	99065889	468414026

THE DIFFERENT CUSTOM-HOUSES HAVE RECEIVED TH

a) IMPORTS. (in hard dollars)		1870	1871
Custom-Houses:			
* Buenos-Aires	Prov. of Buen.-Aires	39934333	33393302
* Patagones	Prov. of Buen.-Aires	—	—
* San Nicolás	Prov. of Buen.-Aires	242540	212987
* Rosario	P. Santa-Fé.	4661793	6541990
* Santa-Fé	P. Santa-Fé.	163336	274202
* Concordia	Prov. of Entre-Rios	436173	621754
* Gualeguay	Prov. of Entre-Rios	59596	339674
* Gualeguaychú	Prov. of Entre-Rios	140327	322503
* La Paz	Prov. of Entre-Rios	4705	43544
* La Victoria	Prov. of Entre-Rios	25948	199615
* Paraná	Prov. of Entre-Rios	216605	162582
* Uruguay	Prov. of Entre-Rios	61312	234154
* Bella-Vista	Prov. of Corrientes.	114383	55347
* Corrientes	Prov. of Corrientes.	292586	215112
* Goya	Prov. of Corrientes.	104960	151155
* Paso de los Libres	Prov. of Corrientes.	91965	77934
† Jujuy	—(Prov. Jujuy)	24602	72855
† Mendoza	—(P. Mendoza)	431632	412104
† Salta	—(Prov. Salta)	209389	238404
† San Juan	— (P. S. Juan)	323763	588040
	Total	47539948	44157258
Note.—The Custom-Houses marked * only receive merchandize by water; those Custom-Houses marked † only receive merchandize by land.			
The imports by water amount to		46550562	42845855
" " " land "		989386	1311403
Both are equal to the above		47539948	44157258

OLLOWING AMOUNTS OF IMPORTS AND EXPORTS.

1872	1873	1874	1870-1874
48038654	59434305	44171765	224972359
5461	50135	1534	57130
400989	444919	351154	1652589
7189720	7046393	7255838	32695734
194474	142180	151051	925243
668506	1309094	929264	3964791
272344	105729	284956	1062299
343497	115339	487947	1409613
50510	3551	29558	131868
226123	38456	244206	734348
234105	140102	229631	983025
244336	138415	250854	929071
64482	56631	50720	341563
255116	325853	292234	1380901
195903	193108	200980	846106
100316	163308	105284	538807
100176	72811	68937	339381
442170	531889	388123	2205918
270901	298220	187547	1204461
301260	454761	279594	1947418
59599143	71065199	55961177	278322725
58484636	69707518	55036976	272625547
1114507	1357681	924201	5697178
59599143	71065199	55961177	278322725

b) EXPORTS.	1870	1871
Custom-Houses:		
Buenos-Aires	23388654	17310012
Patagones	—	—
San Nicolás	769762	985247
Rosario	1502124	1841774
Santa-Fé	—	18193
Concordia	435555	724033
Gualeguay	349594	948410
Gualeguaychú	511785	701339
La Paz	3118	2813
La Victoria	—	148051
Paraná	114002	313544
Uruguay	329757	533633
Bella-Vista	—	987
Corrientes	135253	54023
Goya	7444	304669
Paso de los Libres	21786	82507
Jujuy	229882	161482
Mendoza	760706	1118274
Salta	157048	108490
San-Juan	531676	750456
Total	29248146	26125937
Of which by water	27568834	23987235
by land	1679312	2138702
Total *ut supra*	29248146	26125937

1872	1873	1874	1870-1874
32491248	34432532	30823003	138445449
91596	245363	117538	454497
2549345	2821879	1860910	8987143
2756001	2101085	2484788	10685772
24406	17934	65227	125760
675677	582966	963607	3381838
1258078	751722	1195425	4503229
1462579	598269	724281	3998253
196095	—	113892	315918
113767	19198	163630	444646
599278	340474	306172	1673470
1195871	804685	949165	3813111
3964	964	—	5915
316367	365275	605233	1476151
292881	196870	216980	1018844
66084	147701	131426	449504
158692	163000	128480	836536
901294	1375039	1145180	5300493
90971	378898	443068	1178475
499898	525460	666657	2974147
45743192	45869314	43104712	190091301
44093237	43426917	40721327	179797550
1649955	2442397	2383385	10293751
45743192	45869314	43104712	190091301

c) TOTAL IMPORTS AND EXPORTS.	1870	1871
Custom-Houses		
Buenos-Aires	63322987	50703314
Patagones	—	—
San Nicolás	1012302	1198234
Rosario	6163917	8383764
Santa-Fé	136336	292395
Concordia	871728	1345787
Gualeguay	409190	1288084
Gualeguaychú	652112	1023842
La Paz	7823	46357
La Victoria	25948	347666
Paraná	330607	476126
Uruguay	391069	767787
Bella-Vista	1143383	56334
Corrientes	427839	269135
Goya	112404	455824
Paso de los Libres	113751	160441
Jujuy	254484	234337
Mendoza	1192338	1530378
Salta	336437	346894
San Juan	855439	1338496
Total	76788094	70283195
Of which by land	74119396	66833090
by water	2668698	3450105
Total *ut supra*	76788094	70283195

Some articles of both Imports and Exports are free of duties. The following list shows the proportion between the free and the dutiable; values in hard dollars.

	1870		1871	
	Imports	Exports	Imports	Exports
Merchandize subject to duties	43354655	26659892	35539378	23192127
Transit	3270111	93321	3853628	250416
Paid duties	46624766	26753213	39393006	23442543
Products free of duties	915182	2494933	4743237	2683394
Transit	—	—	21015	—
Free total	915182	2494933	4764252	2683394

1872	1873	1874	1870-1874
80529902	93866837	74994759	363417799
97057	295498	119072	511627
295034	3266798	2212064	10639732
9945721	9147478	9740626	43381506
218880	160114	216278	1024003
1344183	1892060	1892871	7346629
1530442	857451	1480381	5565528
1806076	713608	1212228	5407866
246605	3551	143450	447786
339890	56754	407836	1178994
833477	480576	535803	2656589
1440207	943100	1200019	4742182
68446	57595	50720	1376478
571483	691128	897467	2857052
488784	389978	417960	1864950
166400	311009	236710	988311
258868	235811	192417	1175917
1342464	1906928	1533303	7506411
361872	677118	628615	2380936
801158	980221	946251	4921565
105342335	116934513	99065889	468414026
102577873	113134435	95758303	452423097
2764462	3800078	3307586	15990929
105342335	116934515	99065889	468414026

1872		1873		1874		1870-1874	
Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
51745741	42467264	62275301	41644836	45756963	38225048	238672038	172189167
4924812	872453	4471384	747209	3620166	1188217	20104101	3151616
56670553	43339717	66746685	42392045	49377129	39413265	258812139	175340783
2889603	2403345	4183572	3477269	6430940	3691447	19162534	14750388
38987	130	134942	—	153108	—	348052	130
2928590	2403475	4318514	3477269	6584048	3691447	19510586	14750518

PRINCIPAL ARTICLES OF IMPORTATION SUBJECT TO DUTIES OF THE EXPORT

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Cotton Textures. Metres.				
Belgium	353179	62936	469838	77747
Bolivia	77522	6589	81631	8348
Brazil	20217	2953	29815	7202
Chile	5090354	466326	3668395	337444
England	20731280	2410613	26256733	2714303
France	423239	62080	844670	119794
Germany	51624	8508	170011	22378
Italy	100185	11956	340561	41823
Paraguay	77407	6465	23789	2904
United States	61216	9074	47151	13925
Uruguay	2681373	243924	2942818	311337
Other countries	23071	3715	105665	11208
In Transit	15738415	1416446	19356596	1734624
Total	45429082	4711585	54337673	5403077
Woollen Textures. Metres.				
Belgium	296453	245953	347940	362711
Bolivia	4423	3006	2608	1260
Brazil	9181	2140	13694	8162
Chile	178292	101980	92178	73002
England	710744	456965	1507370	929360
France	436616	337470	825528	635033
Germany	23918	15155	104583	98348
Italy	5812	3371	119002	89704
Paraguay	3451	1527	11446	8594
Spain	—	—	3054	3213
Uruguay	107598	59424	113954	97362
Other countries	7017	3731	—	—
In Transit	98625	63112	157502	113840
Total	1882130	1293834	3298859	2420589
Woollen and Hemp Textures. Metres.				
Belgium	106563	34625	178933	46915
Brazil	—	—	22092	4558
Chile	89638	15454	39456	5983

FROM 1871 TO 1874 INCLUSIVE, CLASSIFIED UNDER THE NAMES ING COUNTRIES.

1873		1874		1871-1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
477937	85016	377081	68731	1678035	294430
663	135	2297	243	162113	15315
3326	260	4605	712	57963	11127
5069564	493599	3351164	322991	17179477	1620360
25604708	2359216	21745374	1952640	94338095	9436772
704231	117113	565916	92452	2538056	391439
428875	56608	191909	31759	842409	119253
324385	40838	178332	21000	943463	115617
43992	3723	2950	286	148138	13378
5418	1101	18862	4046	132647	28146
1609249	156739	2005803	190129	9239243	902169
24682	2687	26271	2631	179689	20241
14434635	1259421	13123025	1165032	62652671	5575523
48731665	4576456	41653079	3852652	190151499	18543770
359413	407338	198213	238815	1202019	1254817
149	46	131	62	7311	4374
3655	5175	696	1044	27226	16521
221485	110215	77553	72395	569508	356592
290664	205701	220612	158368	639777	477572
1290505	904564	584916	449731	4093535	2740620
1070290	835348	801359	551012	3133793	2358863
118374	93207	32152	31473	275340	217755
991	733	950	950	16838	11804
11646	15186	250	500	14950	18899
119652	91181	132693	75366	473897	323333
7896	2964	955	2091	15868	8786
144626	134116	124579	112325	525332	423393
3539346	2805774	2175059	1694132	10995394	8214329
352435	70336	209714	52712	847645	204588
9370	3197	52406	5149	83868	12904
45158	8169	13492	2283	187744	31909

WHERE FROM.	1871		1872		Qu
	Quantities.	Value.	Quantities.	Value.	
England	2970212	380876	4612443	493557	
France	86510	25098	220233	50114	
Germany	72851	6929	135523	16456	
Italy	4290	1559	201533	35353	
United States	122118	36783	64592	17955	
Uruguay	136715	18208	166876	36160	
Other countries	2867	783	39733	3062	
In Transit	211413	26771	340502	36407	
Total	3803177	547086	6021916	746519	
Piece silk-goods, Metres.					
Belgium	56997	41177	16240	18442	
Chile	8009	8378	7295	7687	
England	60936	54661	107988	83571	
France	165919	113452	246123	200357	
Germany	—	—	2669	2467	
Italy	73664	79649	95189	129911	
Spain	274	1167	4855	14405	
United States	—	—	—	—	
Uruguay	7481	7081	5809	7176	
Other countries	3265	3603	7566	11652	
In Transit	2916	3273	810	1125	
Total	379461	312441	494544	476793	
Other silk-goods.					
Belgium	—	32954	—	28332	
Brazil	—	10404	—	5308	
Chile	—	16918	—	5195	
East-Indies	—	24798	—	23864	
England	—	114899	—	240559	
Germany	—	122158	—	175507	
France	—	2695	—	2072	
Italy	—	9136	—	20082	
Spain	—	3556	—	4105	
Uruguay	—	10714	—	12356	
Other countries	—	2124	—	1955	
In Transit	—	12822	—	8004	
Total	—	363178	—	527379	

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
4233360	510962	2817818	329651	14633833	1715046
219121	46934	166974	45208	692838	167354
93653	10369	140973	13946	443000	47700
15521	4835	9006	2103	230350	43850
251833	85174	72827	23922	511370	163814
86922	12483	228713	33956	619226	100807
2921	494	38655	4811	84176	9150
136954	19964	153544	17670	842413	100811
5447248	772917	3904122	531411	19176463	2597933
26690	24761	32792	16102	132719	100482
7673	9402	7548	6452	30525	31919
190515	143340	74679	56479	434118	338081
769434	610334	378241	363633	1559717	1287746
14959	13044	19697	16781	37325	32292
107095	137897	26954	28369	302902	375826
30766	23921	3761	3443	21767	41621
13121	34724	3517	9527	47817	59823
2048	6037	—	—	2048	6037
2147	3273	23197	23754	36175	42282
5777	4288	5785	4092	15288	12778
1170225	1011021	576171	528632	2620401	2328887
—	38536	—	1474	—	101296
—	—	—	1581	—	17293
—	12958	—	8328	—	43399
—	16040	—	7077	—	71779
—	127759	—	66005	—	549222
—	373330	—	219333	—	890328
—	10277	—	1488	—	16532
—	42919	—	2785	—	74922
—	697	—	—	—	8358
—	15643	—	15939	—	54652
—	2950	—	—	—	7069
—	7030	—	3580	—	31436
—	648139	—	327590	—	1866286

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Mixed Textures. Metres.				
Belgium	291537	63895	304453	60740
Chile	282788	54090	220682	44312
England	1775547	442095	3447985	833029
France	128204	35096	408235	89262
Germany	136817	21108	392110	54285
Italy	16163	2739	71474	16873
Spain	46	50	1626	2000
Uruguay	116455	23644	141631	41881
Other countries	4972	1023	22945	8110
In Transit	419744	70946	350280	73869
Total	3172273	714686	5361421	1224361
Divers Textures.				
Belgium	—	71642	—	115529
Bolivia	—	5409	—	3004
Brazil	—	1973	—	13567
Chile	—	147188	—	130538
East-Indies	—	—	—	—
England	—	795954	—	904895
France	—	70911	—	216055
Germany	—	83984	—	143787
Holland	—	8075	—	573
Italy	—	17592	—	76074
Paraguay	—	3918	—	1020
Spain	—	4360	—	9314
Uruguay	—	86467	—	88355
Other countries	—	1164	—	13719
In Transit	—	394570	—	480288
Total	—	1693207	—	2196718
Cotton thread. Kilogr.				
Belgium	—	—	3952	3371
Chile	—	14157	2147	3452
England	—	11798	6058	3415
France	—	395	1801	2015
Uruguay	—	8348	425	322
Other countries	—	1475	373	363
Transit	—	27896	64	88
Total	—	64069	14820	13026

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
308734	82329	133406	35793	1038130	242757
389580	71672	205746	42057	1318820	212131
4787067	1241682	2219767	608491	12230366	3125297
403509	146884	172395	63605	1098796	334847
542173	97390	247720	56008	1112343	228791
101650	29331	11529	2273	200816	51216
7505	4096	6903	1818	16080	7964
165203	40565	143858	40433	567147	146523
8118	3562	8821	2226	44856	14921
694547	135829	432990	100439	1897561	381083
7408086	1853340	3583135	953143	19524915	4745530
—	47853	—	30419	—	265443
—	306	—	430	—	9149
—	242	—	1160	—	16942
—	136932	—	96680	—	511338
—	7671	—	—	—	7671
—	1344365	—	855690	—	3900904
—	208215	—	189407	—	684588
—	127941	—	109569	—	465281
—	770	—	—	—	9418
—	112727	—	24357	—	230750
—	1688	—	24	—	6650
—	19380	—	18860	—	51914
—	62734	—	86974	—	324530
—	7586	—	396	—	22865
—	414620	—	385858	—	1675336
—	2493030	—	1799824	—	8182779
—	438	—	234	—	4043
—	10906	—	8433	—	36948
—	11434	—	19386	—	46033
—	3652	—	3515	—	9577
—	1093	—	1247	—	11010
—	345	—	2176	—	4359
—	25943	—	15646	—	69573
—	53811	—	50637	—	181543

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Twine of Flax and Hemp. Kilogs.				
Chile	8652	2820	2251	1258
England	60312	31588	106354	33921
France	6055	358	10688	5436
Germany	609	3257	936	1094
Italy	3111	1283	1078	374
Uruguay	3515	1200	1601	911
Other countries	574	301	92	60
Transit	333	259	720	398
Total	83161	41066	123720	43452
Divers Threads.				
Belgium	—	2543	—	2032
Chile	—	5349	—	12464
England	—	98580	—	132358
France	—	1946	—	3202
Germany	—	586	—	1455
Uruguay	—	2416	—	2510
Other countries	—	932	—	283
Transit	—	730	—	46379
Total	—	113082	—	200683
Silk-thread for sewing and embroidering. Kilogs.				
Belgium	530	9336	376	4876
Chile	288	2777	173	2222
England	261	3738	122	1901
France	1562	15556	1864	27197
Germany	—	—	27	486
Italy	263	3194	1148	14754
Spain	23	450	1	18
Uruguay	45	576	1846	26574
Other countries	155	2812	30	560
Transit	4	82	1	18
Total	3071	38521	5588	78606
Ready-made and under-clothing.				
Belgium	—	77567	—	129966
Brazil	—	1489	—	6455
Chile	—	21011	—	19359

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	6167	—	4737	—	14982
—	147760	—	146053	—	359322
—	16944	—	8523	—	34160
—	197	—	265	—	1914
—	1471	—	4355	—	7483
—	11264	—	6172	—	19547
—	2467	—	9751	—	12579
—	14618	—	16788	—	32063
—	200888	—	196644	—	482050
—	2344	—	252	—	7171
—	2523	—	1306	—	21642
—	44456	—	628	—	276022
—	1871	—	—	—	7019
—	780	—	—	—	2821
—	214	—	497	—	5637
—	697	—	269	—	2181
—	6210	—	339	—	53658
—	59095	—	3291	—	376151
1331	20957	436	7671	2673	43440
279	3889	106	1482	786	10370
1674	30122	410	7598	2467	43359
3426	45107	1331	23812	8183	111072
541	9562	169	2787	737	12835
513	4062	51	595	1975	22605
70	1265	4	75	98	1808
33	577	93	1398	2017	29125
91	1556	—	—	276	4928
27	434	81	826	113	1360
7985	117531	2681	46244	19325	280902
—	178600	—	32276	—	418409
—	2851	—	3026	—	13821
—	50257	—	36868	—	127485

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
England	—	418468	—	848751
France	—	347963	—	961863
Germany	—	581524	—	48630
Italy	—	43385	—	114945
Paraguay	—	7451	—	232
Spain	—	2651	—	1435
Uruguay	—	44226	—	88191
Other countries	—	2281	—	32589
Transit	—	51552	—	89409
Total	—	1043562	—	2341825
Mens' Hats and Caps.				
Belgium	—	143435	—	135703
Brazil	—	1860	—	4357
Chile	—	38116	—	31053
England	—	120628	—	186877
France	—	159908	—	445576
Germany	—	2701	—	15207
Italy	—	32416	—	31910
Spain	—	1201	—	623
Uruguay	—	22492	—	61062
Other countries	—	1311	—	18968
Transit	—	59267	—	125107
Total	—	583335	—	1056443
Boots and Shoes of all kinds.				
Belgium	—	53655	—	155484
Brazil	—	1433	—	3976
Chile	—	19951	—	25360
England	—	305380	—	540832
France	—	109023	—	290365
Germany	—	12527	—	12146
Italy	—	135884	—	21940
Spain	—	9751	—	15034
Uruguay	—	103666	—	308514
Other countries	—	12538	—	41694
Transit	—	17735	—	40325
Total	—	781543	—	1455670

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	1134726	—	516175	—	2918120
—	1502167	—	959037	—	3771030
—	185472	—	159486	—	419106
—	96978	—	69910	—	325228
—	1705	—	—	—	9388
—	9558	—	8603	—	22247
—	54254	—	65227	—	251898
—	13946	—	3987	—	52803
—	124654	—	97578	—	363193
—	3355168	—	1952173	—	8692728
—	140433	—	68531	—	488102
—	625	—	—	—	6842
—	48674	—	31386	—	149229
—	233512	—	89744	—	630761
—	461967	—	369752	—	1437203
—	12946	—	5945	—	36799
—	58513	—	31717	—	154556
—	841	—	—	—	2665
—	29105	—	27576	—	140235
—	22059	—	667	—	43005
—	126515	—	113087	—	423976
—	1135190	—	738415	—	3513383
—	273654	—	140829	—	623622
—	320	—	—	—	5729
—	41867	—	26499	—	113677
—	951810	—	400887	—	2198909
—	503477	—	294462	—	1197327
—	46864	—	80044	—	151581
—	13007	—	16113	—	186944
—	47408	—	24684	—	96877
—	154843	—	88719	—	655742
—	15846	—	3319	—	73397
—	37528	—	26511	—	122099
—	2086624	—	1102067	—	5425904

WHERE FROM.	1871		1872	
	Value.	Quantities.	Value.	Quantities.
Tanned skins and leather.				
Belgium	—	8363	—	22720
Bolivia	—	776	—	358
Chile	—	12169	—	10803
England	—	9053	—	28758
France	—	35389	—	161762
Germany	—	1492	—	3950
Italy	—	358	—	10491
Uruguay	—	6577	—	20116
Other countries	—	3555	—	2337
Transit	—	543	—	4111
Total	—	78275	—	265456
Saddlery of all kinds.				
Belgium	—	3826	—	3386
England	—	73664	—	70283
France	—	15020	—	31639
Germany	—	4513	—	4881
Italy	—	8113	—	3064
United States	—	968	—	3230
Uruguay	—	2150	—	237
Other countries	—	1415	—	1868
Transit	—	1181	—	673
Total	—	110850	—	119261
Carriages.				
Belgium	—	540	—	1620
Chile	—	375	—	550
England	—	9701	—	10296
France	—	29672	—	50304
Germany	—	4832	—	4789
Italy	—	14938	—	8974
United States	—	1589	—	1460
Uruguay	—	3192	—	8005
Other countries	—	—	—	863
Transit	—	930	—	1382
Total	—	65819	—	88243

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	23578	—	26689	—	81350
—	4640	—	172	—	5946
—	17748	—	10052	—	50772
—	45832	—	15381	—	99024
—	168640	—	121835	—	487626
—	5016	—	4003	—	14461
—	8504	—	6884	—	26237
—	8609	—	9513	—	44865
—	593	—	7975	—	14460
—	11820	—	12401	—	28875
—	294980	—	214905	—	853616
—	3086	—	2187	—	12485
—	94596	—	70700	—	309243
—	54655	—	21439	—	122753
—	9738	—	11666	—	30798
—	3497	—	7481	—	22155
—	2994	—	1883	—	9075
—	3603	—	1751	—	7741
—	1061	—	923	—	5267
—	1315	—	930	—	4099
—	174545	—	118960	—	523616
—	2950	—	4631	—	9741
—	1100	—	3000	—	5025
—	22416	—	9515	—	51928
—	98936	—	66924	—	245836
—	2436	—	4220	—	16327
—	3180	—	4833	—	31925
—	27408	—	17952	—	54954
—	3120	—	2415	—	10187
—	1095	—	2272	—	4230
—	5500	—	2950	—	10762
—	168141	—	118712	—	440915

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Perfumery.				
Belgium	—	2278	—	8707
Chile	—	5053	—	5831
England	—	59276	—	109043
France	—	49228	—	152882
Germany	—	16631	—	30522
Holland	—	6458	—	9913
Spain	—	—	—	4233
United States	—	35143	—	64004
Uruguay	—	9570	—	24277
Other countries	—	237	—	2129
Transit	—	2250	—	7405
Total	—	186124	—	418946
Gold and Silver work.				
Belgium	—	14517	—	30433
Brazil	—	3363	—	4848
England	—	153605	—	239404
France	—	36440	—	266303
Germany	—	495	—	11195
Italy	—	6938	—	2066
Uruguay	—	5380	—	14162
Other countries	—	730	—	3871
Transit	—	885	—	1265
Total	—	222353	—	573547
Precious stones.				
Belgium	—	—	—	400
England	—	—	—	54913
France	—	—	—	74759
Germany	—	—	—	—
Total	—	—	—	130072
Works of art.				
Belgium	—	985	—	664
England	—	4791	—	8323
France	—	7935	—	24505
Germany	—	1124	—	107
Italy	—	38692	—	11596
Spain	—	2569	—	3145

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	16894	—	8339	—	36218
—	5740	—	2445	—	19069
—	108948	—	43605	—	320872
—	167992	—	84064	—	454166
—	49264		18373	—	114790
—	8303	—	4320	—	28994
—	413	—	490		5136
—	16690	—	7060	—	57597
—	68459	—	33968	—	201574
—	2934	—	320	—	5620
—	11267	—	6869	—	27791
—	456904	—	209853	—	1271827
—	2045	—	3386	—	50381
—	2385	—	700	—	11296
—	297525	—	109946	—	800480
—	520181	—	372896	—	1195820
—	26294	—	10002	—	47986
—	1054	—	2048	—	12106
—	7461	—	14835	—	41838
—	8147	—	2429	—	15177
—	558	—	2598	—	5306
—	865650	—	518840	—	2180390
—	60	—	—	—	460
—	—	—	4500	—	4500
—	67193	—	29084	—	151190
—	170922	—	97419	—	343100
—	238175	—	131003	—	499250
—	1741	—	1132	—	4522
—	4999	—	10198	—	28311
—	78749	—	56787	—	167976
—	2832	—	3089	—	7152
—	8731	—	8696	—	57715
—	249	—	467	—	6430

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
United States	—	9904	—	3793
Uruguay	—	1640	—	2271
Other countries	—	468	—	1511
Transit	—	128	—	*180*
Total	—	68236	—	46095
Articles for maufacturing purposes.				
Belgium	—	2915	—	11944
Brazil	—	13698	—	1952
England	—	63107	—	87384
France	—	117370	—	151809
Germany	—	3926	—	8360
Holland	—	—	—	—
Italy	—	12377	—	11558
Paraguay	—	—	—	135
Spain	—	2304	—	1661
United States	—	7846	—	1097
Uruguay	—	111750	—	*127859*
Other countries	—	1903	—	4951
Transit	—	9245	—	9623
Total	—	346441	—	418383
Haberdashery and Hardware.				
Belgium	—	155497	—	188278
Brazil	—	10447	—	21199
Chile	—	36361	—	42702
East-Indies	—	44449	—	5495
England	—	472226	—	687863
France	—	294817	—	919281
Germany	—	67250	—	133419
Holland	—	11144	—	2728
Italy	—	38822	—	33439
Paraguay	—	2956	—	106
Portugal	—	2066	—	617
Spain	—	8552	—	6475
United States	—	16322	—	11040
Uruguay	—	33828	—	74030
Other countries	—	1230	—	17798
Transit	—	21861	—	27134
Total	—	1217828	—	2171604

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value
—	22484	—	17365	—	53546
—	685	—	803	—	5399
—	792	—	8916	—	11687
—	272	—	686	—	1266
—	121534	—	108139	—	344004
—	9177	—	9241	—	33327
—	595	—	2731	—	18976
—	60642	—	37455	—	248588
—	235499	—	51863	—	556541
—	16928	—	14124	—	43338
—	5901	—	3825	—	9726
—	18274	—	7466	—	49675
—	7683	—	2923	—	10741
—	3852	—	2433	—	10250
—	4008	—	8199	—	21150
—	141291	—	29069	—	409969
—	2302	—	346	—	9502
—	5760	—	960	—	25588
—	511912	—	170635	—	1447371
—	239203	—	155717	—	738695
—	949	—	3551	—	36146
—	73088	—	36847	—	188998
—	3021	—	234319	—	64553
—	688123	—	385414	—	2233626
—	1636386	—	1035371	—	3885855
—	290036	—	11588	—	734014
—	647	—	1300	—	15819
—	102293	—	57577	—	232131
—	1009	—	—	—	4071
—	6561	—	—	—	9244
—	30040	—	11350	—	56717
—	11336	—	8400	—	47098
—	42301	—	28946	—	179105
—	16957	—	1498	—	37483
—	45765	—	38178	—	132938
—	3187715	—	2010056	—	8596493

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Arms of all kinds.				
Belgium	—	64530	—	72093
England	—	29165	—	37091
France	—	15046	—	48397
Germany	—	2508	—	5980
Spain	—	435	—	2380
United States	—	2158	—	11567
Uruguay	—	257	—	3215
Other countries	—	1287	—	1744
Transit	—	3611	—	4545
Total	—	118997	—	187012
Articles of Copper and Brass.				
Belgium	—	424	—	1276
Chile	—	2377	—	2482
England	—	25682	—	78868
France	—	15302	—	50224
Germany	—	2933	—	4657
Italy	—	748	—	1583
United States	—	2554	—	3332
Uruguay	—	179	—	1367
Other couutries	—	125	—	965
Transit	—	117	—	188
Total	—	50441	—	144942
Articles of Iron and Steel.				
Belgium	—	126223	—	151877
Chile	—	20488	—	18707
England	—	1162276	—	1375429
France	—	157258	—	74314
Germany	—	23278	—	36319
Holland	—	15122	—	8988
Italy	—	3208	—	3091
Spain	—	713	—	3228
United States	—	86484	—	112077
Uruguay	—	64531	—	121530
Other countries	—	20360	—	14465
Transit	—	23656	—	13534
Total	—	1703597	—	1933559

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	141462	—	108869	—	386954
—	37457	—	32767	—	136480
—	58826	—	39860	—	162129
—	4358	—	5435	—	18281
—	248	—	224	—	3287
—	1599	—	2339	—	7410
—	7614	—	4857	—	26196
—	3289	—	2122	—	8442
—	8959	—	8373	—	25488
—	263812	—	204846	—	774667
—	15657	—	—	—	17357
—	1741	—	1355	—	7955
—	96585	—	4636	—	245327
—	44587	—	31182	—	141295
—	5539	—	44192	—	17765
—	1966	—	1737	—	6034
—	2381	—	10591	—	18858
—	1212	—	605	—	3363
—	1472	—	299	—	2861
—	254	—	1575	—	2134
—	171394	—	96172	—	462949
—	173760	—	129420	—	581280
—	16308	—	8659	—	64162
—	2022164	—	1342701	—	5902570
—	456474	—	409674	—	1097720
—	32814	—	35880	—	128291
—	1869	—	7600	—	33579
—	7789	—	6419	—	20507
—	140	—	—	—	4081
—	720494	—	78594	—	484649
—	43264	—	35590	—	264915
—	5546	—	1751	—	42122
—	38672	—	44152	—	120014
—	3006294	—	2100440	—	8743890

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Rough Iron and Steel, Kilogs.				
Belgium	—	—	—	—
Chile	11303	936	14374	792
England	6113971	355745	9146955	540396
France	1527	176	50775	2939
Uruguay	214899	16724	580648	51934
Other countries	1104	76	19211	1956
Transit	129489	9289	416979	26522
Total	6472293	382946	10228942	624539
Machinery.				
Belgium	—	1320	—	3312
Brazil	—	109	—	8636
Chile	—	2386	—	2837
England	—	30396	—	45905
France	—	5077	—	23174
Germany	—	10904	—	32499
Italy	—	2830	—	3011
United States	—	42787	—	91302
Uruguay	—	10086	—	11842
Other countries	—	380	—	1529
Transit	—	10082	—	27191
Total	—	116357	—	251238
Agricultural Implements.				
Belgium	—	276	—	1882
England	—	17842	—	2041
France	—	986	—	5409
Germany	—	284	—	4906
United States	—	41130	—	678
Uruguay	—	1088	—	48169
Other countries	—	1162	—	448
Transit	—	6833	—	775
Total	—	69601	—	64308
Musical Instruments.				
Belgium	—	1301	—	2918
Chile	—	859	—	619
England	—	10130	—	5258

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
56805	3626	524853	35565	581658	39191
6841	536	323	21	32841	22825
9305409	734730	7304082	517848	31870417	2148719
3675	449	7769	464	63746	4028
74077	8056	31506	3911	901130	80625
77409	5081	31302	1610	129026	8723
91027	10915	199788	12793	837283	59519
9615243	763393	8099623	572212	34416101	2343090
—	8984	—	22331	—	35947
—	5229	—	2600	—	16574
—	51510	—	74033	—	168946
—	97689	—	76681	—	250671
—	6157	—	4940	—	16320
—	63387	—	37513	—	129151
—	1679	—	3588	—	325362
—	109935	—	81338	—	11108
—	15478	—	14347	—	51753
—	2687	—	678	—	5274
—	32351	—	6236	—	75860
—	395086	—	324285	—	1086966
—	—	—	255	—	2413
—	638	—	1844	—	27456
—	9759	—	995	—	16646
—	2638	—	—	—	2963
—	2361	—	398	—	4802
—	61564	—	50280	—	201143
—	621	—	297	—	2528
—	17029	—	2442	—	27079
—	94610	—	56511	—	285030
—	7229	—	2370	—	13818
—	963	—	181	—	2622
—	69612	—	45744	—	164149

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
France	—	28564	—	80790
Germany	—	18664	—	32129
Italy	—	7969	—	10833
Spain	—	558	—	2166
United States	—	1420	—	4354
Uruguay	—	3251	—	2580
Other countries	—	926	—	3709
Transit	—	1191	—	2380
Total	—	74833	—	147736
Stationery.				
Belgium	—	2107	—	11800
Brazil	—	1858	—	6296
Chile	—	1825	—	6784
England	—	40911	—	128365
France	—	29600	—	106730
Germany	—	6201	—	9479
Italy	—	4702	—	2693
Spain	—	498	—	15413
United States	—	2568	—	4934
Uruguay	—	4303	—	15964
Other countries	—	84	—	766
Transit	—	780	—	8762
Total	—	95437	—	317986
All kinds of paper, including wall.				
Belgium	—	11143	—	32571
Chile	—	16579	—	19047
England	—	11034	—	33942
France	—	59832	—	125014
Germany	—	10538	—	8099
Holland	—	3759	—	1472
Italy	—	93849	—	119072
Spain	—	28309	—	66834
United States	—	2554	—	1306
Uruguay	—	28328	—	37167
Other countries	—	3010	—	316
Transit	—	7641	—	18421
Total	—	276576	—	463261

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	9403	—	9529	—	34320
—	141102	—	89740	—	340196
—	13170	—	16260	—	48232
—	1131	—	2410	—	6265
—	5072	—	3553	—	14456
—	2740	—	1880	—	10394
—	2772	—	—	—	7407
—	4334	—	7481	—	15386
—	255528	—	179148	—	657245
—	16466	—	5764	—	36137
—	4442	—	3304	—	15900
—	2040	—	1751	—	12400
—	11808	—	13197	—	40685
—	104720	—	57511	—	331507
—	130201	—	82945	—	349476
—	1941	—	2771	—	12107
—	2148	—	2362	—	20421
—	1941	—	2110	—	24318
—	4779	—	9527	—	21808
—	2053	—	2883	—	5786
—	3203	—	7920	—	20665
—	285742	—	192045	—	891210
—	19040	—	12824	—	75578
—	16497	—	12479	—	64602
—	7665	—	4476	—	30778
—	39904	—	40564	—	125444
—	205489	—	91977	—	482312
—	1163	—	970	—	7364
—	149254	—	172793	—	534968
—	81011	—	52672	—	228826
—	41823	—	19354	—	126672
—	3761	—	1108	—	8729
—	2430	—	207	—	5963
—	5800	—	7146	—	39008
—	573837	—	416570	—	1730244

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Woods for building. Metres.				
Brazil	13346	6113	10503	5067
England	798988	116714	8016	3199
Germany	17929	5495	7308	3509
Paraguay	5331	6169	33953	24648
United States	7553352	996275	3303146	1518054
Uruguay	241588	30876	135801	54644
Other countries	337888	41467	80430	43088
Transit	214880	37482	88347	37051
Total	9183302	1240591	3667504	1689260
Woods for cabinet-ware. Metres.				
England	75879	10038	—	—
France	6237	1244	3064	2301
Germany	26890	9785	12700	7668
United States	65410	19671	4407	6437
Other countries	5267	1629	3646	540
Transit	255	151	7750	3121
Total	179938	42518	31567	20067
Divers woods.				
Belgium	—	1459	—	1814
Brazil	—	13285	—	21465
England	—	455	—	890
France	—	1194	—	20413
Germany	—	1648	—	5377
Holland	—	1195	—	1292
Italy	—	4355	—	2846
Paraguay	—	13512	—	4410
Spain	—	2670	—	792
United States	—	6941	—	28468
Uruguay	—	6853	—	8253
Other countries	—	648	—	14684
Transit	—	1478	—	1876
Total	—	55693	—	112580
Furniture.				
Belgium	—	680	—	4601
Chile	—	10449	—	9530
East-Indies	—	3967	—	12588

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
912	364	—	—	24761	11544
—	—	—	—	807004	119913
32330	15363	—	—	57567	24367
21709	43690	14557	15628	75550	90135
6464063	2769051	4375524	1907175	21696085	7190555
68742	30844	89559	40433	535690	156797
118628	56897	—	—	536946	141452
56709	25092	138577	45521	498513	145146
6763093	2941301	4618217	2008757	24232116	7879909
—	—	—	—	75879	10038
24141	13683	—	—	33442	18228
27793	17948	9752	5454	77135	40855
111525	97311	18282	23901	199624	147320
2391	3592	6981	18330	18285	23091
1771	4740	900	486	10676	8498
167621	137274	35915	48171	415041	248030
—	482	—	13673	—	17428
—	87003	—	14605	—	136358
—	2279	—	1632	—	5256
—	32368	—	17617	—	71582
—	6872	—	13347	—	27244
—	168	—	353	—	3008
—	6183	—	6363	—	19747
—	3895	—	2209	—	24026
—	2503	—	957	—	6922
—	43822	—	43909	—	123140
—	11762	—	3297	—	30165
—	31542	—	2908	—	49792
—	1890	—	2047	—	7291
—	230769	—	122917	—	521959
—	9475	—	10493	—	25249
—	7149	—	7748	—	34876
—	17625	—	2787	—	36967

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
England	—	30574	—	50018
France	—	69479	—	130535
Germany	—	127802	—	129483
Italy	—	22217	—	6460
United States	—	71113	—	125027
Uruguay	—	20854	—	35848
Other countries	—	3011	—	8729
Transit	—	3455	—	3046
Total	—	363601	—	515865
Flooring-tiles. Thousands.				
Belgium	163	4531	99	3144
England	4	184	174	9458
France	7606	124666	11567	206801
Italy	1406	22818	2029	31569
Spain	8	500	144	2562
Uruguay	887	14415	553	8575
Other countries	16	269	74	3110
Transit	148	2085	470	7074
Total	10238	169468	15110	272293
Roofing-tiles. Thousands.				
France	2391	94357	5629	262878
Uruguay	919	43333	742	33782
Other countries	45	2062	3	37
Transit	588	25751	631	29411
Total	3943	165503	7005	326108
Flat Glass-ware. Metres.				
Belgium	256755	34879	143129	66195
England	24277	2362	7116	6110
France	4344	611	1112	865
Germany	4228	1771	10086	4874
Holland	26432	3588	6832	3073
Uruguay	7486	1079	48306	19737
Other countries	1890	271	450	208
Transit	1064	152	7394	2189
Total	326476	44713	224425	103251

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	300018	—	184137	—	684169
—	218258	—	160937	—	636480
—	50535	—	116736	—	247863
—	12627	—	19018	—	60322
—	274299	—	214418	—	684857
—	29181	—	13002	—	98885
—	14945	—	8322	—	35007
—	14089	—	14670	—	35260
—	948201	—	752268	—	2579935
146	2037	107	4396	515	14108
66	1626	25	803	269	12071
16990	311693	10362	200586	46525	843746
2047	31241	187	5608	5669	91236
157	2577	67	1194	376	6833
133	2642	294	6001	1867	31633
80	2728	174	3264	344	9371
516	9090	409	8472	1543	26721
20135	363634	11625	230324	57108	1035719
9240	417820	5441	261159	22701	10362214
281	8548	580	26117	2522	111780
130	6565	59	2696	237	11160
449	21046	657	30062	2325	106270
10100	453779	6737	320034	27785	1265424
173633	91150	136507	92820	710024	285044
4224	3205	4961	3880	40578	15557
38012	48964	9572	6978	53040	57418
16633	7481	11630	6887	42577	21013
3308	1552	22464	6044	59036	14257
3369	1646	1118	540	60279	23002
166	76	28	24	2534	579
161	220	2154	1256	10773	3817
239506	154294	188434	118429	978841	420687

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
General Glass-ware.				
Belgium	—	29424	—	30807
Chile	—	1478	—	1406
England	—	54415	—	50617
France	—	22471	—	46040
Germany	—	17135	—	15455
Holland	—	5928	—	11202
United States	—	33	—	11538
Uruguay	—	2678	—	16859
Other countries	—	1959	—	1144
Transit	—	2170	—	1119
Total	—	137691	—	186187
Fine Crockery-ware.				
England	—	20846	—	49056
France	—	39007	—	50019
Germany	—	7176	—	2554
Uruguay	—	2050	—	1962
Other countries	—	1611	—	6776
Transit	—	533	—	177
Total	—	71223	—	110544
Ordinary Crockery.				
England	—	124475	—	78960
France	—	570	—	4803
Germany	—	11534	—	10391
Other countries	—	7425	—	3987
Transit	—	6006	—	4060
Total	—	150010	—	102201
Paint-stuffs.				
Belgium	—	10043	—	18807
Chile	—	1785	—	8968
England	—	135210	—	190215
France	—	12394	—	39396
Germany	—	22856	—	13276
Italy	—	1637	—	6374
United States	—	21892	—	38054

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	45591	—	40275	—	146097
—	882	—	438	—	4204
—	65726	—	43053	—	213811
—	77330	—	35222	—	181063
—	21522	—	23747	—	77859
—	12069	—	6846	—	36045
—	715	—	385	—	12671
—	3478	—	3259	—	26274
—	2816	—	288	—	6227
—	1263	—	4992	—	9544
—	231392	—	158505	—	713775
—	33198	—	18548	—	121648
—	79982	—	62093	—	231101
—	3917	—	7820	—	21467
—	300	—	932	—	5244
—	5794	—	6109	—	20290
—	672	—	16	—	1398
—	123863	—	95518	—	401148
—	96178	—	107806	—	407419
—	6405	—	10633	—	22411
—	9448	—	6665	—	38038
—	1161	—	5237	—	17810
—	3664	—	12121	—	25851
—	116856	—	142462	—	511529
—	29582	—	20658	—	79090
—	9563	—	4382	—	24698
—	279895	—	165919	—	771239
—	35111	—	40709	—	127610
—	42801	—	29674	—	108607
—	14743	—	1910	—	24664
—	11350	—	36238	—	147771

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Uruguay	—	13539	—	40397
Other countries	—	159	—	9238
Transit.	—	710	—	4304
Total	—	220225	—	369011
Cordage.				
Belgium.	—	—	—	9689
East-Indies	—	479	—	—
England.	—	105709	—	210508
France.	—	11938	—	18309
Germany	—	27322	—	44969
Italy.	—	54264	—	47512
United States.	—	4692	—	10296
Uruguay	—	8210	—	8090
Other countries	—	3595	—	1928
Transit.	—	1130	—	1474
Total	—	217339	—	352775
All kinds of phosphorous matches.				
Belgium.	—	—	—	—
Brazil.	—	—	—	—
Chile.	—	—	—	—
England	—	—	—	—
France.	—	—	—	—
Germany	—	—	—	—
Holland.	—	—	—	—
Italy.	—	—	—	—
Uruguay	—	—	—	—
Other countries	—	—	—	—
Transit.	—	—	—	—
Total	—	—	—	—
Leaf Tobacco. Kilogrs.				
Belgium.	40874	7840	2162	1140
Brazil	—	—	176800	40256
Chile	96069	40165	28	18
England	5927	2986	2820	1467
France	5760	3851	3716	2414
Germany	50348	26103	48824	21298
Italy	7176	3655	197	129

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	51587	—	3505	—	68773
—	6366	—	10656	—	26419
—	4171	—	3306	—	12491
—	485169	—	316957	—	1391362
—	—	—	5687	—	15376
—	8325	—	7765	—	16569
—	67401	—	80573	—	464191
—	20258	—	15535	—	66040
-	36581	—	48796	—	157668
—	60458	—	62781	—	225015
—	19620	—	10329	—	44937
—	13176	—	11088	—	40564
—	4217	—	10565	—	20305
—	1619	—	2325	—	6548
—	231655	—	255444	—	1057213
—	1045	—	13509	—	14554
—	9568	—	1328	—	10896
—	3171	—	2626	—	5797
—	17169	—	3350	—	20519
—	554647	—	118892	—	673539
—	7024	—	5409	—	12433
—	53090	—	2580	—	55670
—	50072	—	90129	—	140201
—	68939	—	19962	—	88901
—	1430	—	452	—	1882
—	11659	—	10522	—	22181
—	777814	—	268759	—	1046573
332	216	36675	6180	80043	15376
80583	28713	86640	30387	344023	99356
80	49	—	—	90177	40232
3726	2011	—	—	12473	6462
—	—	1052	467	10528	6732
139559	55375	59915	24171	298646	126947
276	184	668	454	8317	4422

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Paraguay	249160	83213	394815	110267
United States	110596	57797	297975	131761
Uruguay	228282	82527	103237	31694
Other countries	3314	1988	8813	5325
Transit	25672	9555	31171	10037
Total	823178	319680	1070558	355806
Unstemmed Tobacco. Kilogrs.				
Brazil	747774	289241	1088351	372828
England	10471	5075	6190	2918
Germany	148	91	—	—
United States	94503	38302	35038	16298
Uruguay	153637	67324	203474	84113
Other countries	5212	4338	12884	5742
Transit	21272	9174	16501	6827
Total	1033017	413545	1362438	488726
Cigars. Thousands.				
Belgium	2263	21830	6379	46725
Brazil	664	4188	466	8572
Chile	235	2606	213	3019
England	1583	45570	1815	58801
France	7126	36849	5563	36400
Germany	9596	51131	21683	121049
Holland	5922	29777	5470	32570
Italy	10874	54720	17638	84638
Paraguay	2490	8981	5678	14910
Uruguay	4421	62086	4938	62388
West-Indies	268	14211	449	18688
Other countries	353	2557	381	2403
Transit	2258	9187	366	1915
Total	48053	343693	71039	492078
Common-Salt. Kilogrs.				
France	410000	3395	423936	3535
Portugal	452673	4735	434233	3432
Spain	15019946	156605	38753129	327800
Uruguay	3197732	33512	5224395	43375
Other countries	782745	6934	665203	5335

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
390108	94420	642261	211775	1676344	499675
131566	48842	212321	82372	752458	309772
69162	24469	87006	32131	487687	181221
259	68	19233	1958	31619	9329
28358	7250	51930	16628	137131	43475
838009	261590	1197701	406523	3929446	1343599
926024	319191	824657	329746	3586806	1311006
3075	1531	—	—	19736	9524
21970	8462	—	—	22118	8553
211146	101784	118730	51583	459417	207967
98785	34683	111423	46242	567319	232362
860	410	—	—	18956	10490
46005	15484	17993	7681	101771	39166
1307865	481545	1072803	435252	4776123	1819068
6506	40719	3453	24639	18601	133913
333	3104	533	3401	1996	19265
193	4278	68	1645	709	11548
3572	111994	1920	79111	8890	295276
17409	110887	18273	93662	48371	277798
22397	138217	9187	80530	62823	410927
4847	23294	1977	8499	18216	94140
26565	115262	9086	37616	64163	292236
11285	29255	7029	27219	26482	80565
4020	40701	5156	36174	18535	201349
1525	82722	144	7995	2386	103616
647	5693	36	179	1417	10832
144	1947	1629	7449	4397	20498
99443	708073	58491	408119	277026	1951963
200425	2499	397660	3374	1432021	12803
160080	1462	624200	5346	1671186	14975
31635896	308681	13760184	117652	99169155	910738
6920483	39266	1656699	13882	16999309	130035
573870	5841	361721	3801	2383539	21911

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Transit.....	5424324	55383	10574242	87787
Total.....	25287420	260564	56075138	471264
Stone Coal. Kilogrs.				
England.....	19298549	227258	54780079	5373
France.....	219631	2614	928975	587735
Germany.....	408465	4544	504570	9787
Holland.....	699831	7510	276174	2891
Italy.....	96175	1034	406109	4400
United States.....	453254	4873	456184	31989
Uruguay.....	547255	7817	2988966	4984
Other countries.....	426420	4037	277169	2999
Transit.....	385349	4723	876111	9370
Total	22534929	264410	61494337	659528
Petroleum. Litres.				
United States.....	1622500	173215	2881695	277574
Uruguay.....	578334	64012	361049	35382
Other countries.....	117207	12787	4232	455
Transit.....	196804	21890	395050	39941
Total.....	2514845	271864	3642026	353352
Drugs.				
Belgium.....	—	1836	—	10987
Bolivia.....	—	34049	—	582
Brazil.....	—	1558	—	998
Chile.....	—	15441	—	6159
England.....	—	124277	—	173484
France.....	—	49733	—	48057
Germany.....	—	49379	—	121367
Holland.....	—	3554	- -	4953
Italy.....	—	30268	—	59592
Spain.....	—	3957	—	3743
United States.....	—	37614	—	80202
Uruguay.....	—	26117	—	27110
Other countries.....	—	832	—	3376
Transit.....	—	7743	—	10392
Total.....	—	386358	—	551002

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
2604822	60739	4088371	34676	22691759	238585
42095576	418488	20888835	178731	144346969	1329047
57038263	741103	50518952	700868	181635843	2256964
317241	3951	—	—	1465847	16352
961421	13130	542025	7545	2416481	30592
100470	1361	150592	3895	1227067	15657
—	—	—	—	502284	5434
988828	13792	1550042	21593	5981090	72248
790125	9712	861703	13221	2655267	35734
51960	730	—	—	755549	7766
455022	6276	544283	7667	2260765	28036
60703330	790056	54167597	754789	198900193	2468783
2638153	234094	2191025	180246	9333373	147295
144292	12529	449074	35372	1532749	865129
4565	376	2718	237	128722	13815
583024	50424	357377	30546	1532255	142801
3370034	297423	3000194	246401	12527099	1169040
—	7769	—	5551	—	26143
—	159	—	199	—	34989
—	7310	—	656	—	10522
—	4343	—	3844	—	29787
—	174032	—	179080	—	650873
—	217657	—	135611	—	524368
—	85168	—	58971	—	240575
—	3952	—	3756	—	16215
—	73783	—	30535	—	194178
—	5898	—	1886	—	14484
—	91208	—	26124	—	235148
—	19904	—	12467	—	85598
—	6044	—	3307	—	15559
—	17073	—	11400	—	46608
—	714300	—	473387	—	2125047

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Spices.				
Chile	—	6147	—	2720
East-Indies	—	1787	—	5143
England	—	9568	—	6695
France	—	4704	—	7831
Germany	—	2247	—	9190
Italy	—	5054	—	2092
Spain	—	13355	—	20313
United States	—	1449	—	32662
Uruguay	—	9217	—	10988
Other countries	—	607	—	2086
Transit	—	708	—	998
Total	—	54843	—	100718
Alimentary Preserves.				
England	—	38838	—	5689
France	—	17239	—	57306
Germany	—	1277	—	1727
Italy	—	38599	—	26142
Spain	—	3727	—	1324
United States	—	526	—	5124
Uruguay	—	2528	—	6310
Other countries	—	3068	—	6792
Transit	—	201	—	2831
Total	—	106003	—	113245
Divers Provisions.				
Belgium	—	1325	—	2235
Brazil	—	4043	—	11571
England	—	29196	—	106038
France	—	15230	—	52750
Germany	—	1468	—	2446
Italy	—	33701	—	44876
Spain	—	4160	—	12010
United States	—	267	—	3430
Uruguay	—	5456	—	12505
Other countries	—	5295	—	3975
Transit	—	2124	—	1074
Total	—	102265	—	252910

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	1300	—	1045	—	11212
—	—	—	2717	—	9647
—	16238	—	4934	—	37435
—	11763	—	5559	—	29857
—	2850	—	1440	—	15727
—	7750	—	23497	—	38393
—	35775	—	25103	—	94546
—	11989	—	4783	—	50883
—	7484	—	11784	—	39473
—	139	—	208	—	3040
—	1572	—	240	—	3518
—	96860	—	81310	—	333731
—	55494	—	8968	—	168989
—	352077	—	136201	—	562823
—	3196	—	2040	—	8240
—	26364	—	102319	—	193424
—	22071	—	19600	—	46722
—	36181	—	35462	—	77293
—	45556	—	30307	—	84711
—	8739	—	7181	—	25780
—	18254	—	6999	—	28285
—	627942	—	349077	—	1196267
—	3681	—	78	—	7319
—	14632	—	12844	—	43090
—	164595	—	197483	—	497312
—	23244	—	24203	—	115427
—	2980	—	4032	—	10926
—	59476	—	38252	—	176308
—	13646	—	8121	—	37937
—	30363	—	7237	—	41297
—	15778	—	17561	—	51300
—	11128	—	4834	—	25232
—	2289	—	2914	—	8401
—	341815	—	317559	—	1014549

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Dried Fruits.				
Brazil	—	273	—	3948
Chile	—	69	—	36
England	—	253	—	1884
France	—	22180	—	34930
Italy	—	69804	—	112794
Spain	—	116266	—	55486
Uruguay	—	32605	—	19744
Other countries	—	1522	—	2955
Transit	—	3990	—	1059
Total	—	246962	—	232836
Vermicelli, Macaroni. Kilogrs.				
France	14720	2824	47869	20963
Italy	1558866	298827	1776357	339062
Spain	29780	5789	28922	3706
Uruguay	106777	21410	116218	23729
Other countries	33677	5257	29342	5698
Transit	33125	6494	48492	6700
Total	1776945	340601	2047200	399858
Flour. Kilogrs.				
Belgium	—	—	—	—
Bolivia	1603	214	3882	814
Brazil	—	—	5911	689
Chile	2943360	295280	1229306	144190
England	134158	14842	29906	3292
France	85848	8902	—	—
Germany	—	—	1500	156
Holland	4016	457	—	—
Italy	22968	2450	—	—
United States	1244671	129025	217396	22651
Uruguay	504761	64106	361500	36668
Other countries	903	86	136337	13832
Transit	738769	77116	154864	8698
Total	681057	592478	2140602	230990
Wheat. Kilogrs.				
Bolivia	3346	160	4514	197
Chile	1348052	83519	842558	77106

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	12725	—	1367	—	18313
—	30519	—	52	—	30676
—	4214	—	1350	—	7701
—	19296	—	20577	—	96983
—	163323	—	89476	—	435397
—	184391	—	80424	—	436567
—	22164	—	19876	—	94389
—	3305	—	2076	—	9858
—	5507	—	350	—	10906
—	445444	—	215548	—	1140790
16609	3566	14520	3084	93718	30437
2138130	403816	1409663	293975	6883016	1335680
65691	13389	13530	2768	137923	25652
28852	5671	84250	15242	336097	66052
4864	968	1636	329	69519	12252
31151	6143	21987	4488	134755	23825
2285297	433553	1545586	319886	7655028	1493898
24000	2400	—	—	24000	2400
—	—	2023	183	7508	1211
900	197	461469	40773	468280	41659
523469	54434	3424632	309917	8120767	803821
—	—	—	—	164064	18134
—	—	147464	12753	233312	21625
1200	125	—	—	2700	281
—	—	—	—	4016	457
—	—	—	—	22968	2450
13386	1483	610396	55348	1490043	157605
350273	31316	2649942	237246	4462282	420238
1380	145	—	—	138620	14063
102538	10394	154882	13878	1151053	110086
1017146	100494	7450808	670098	16289613	1594060
315	15	315	36	8520	408
869656	45646	1900741	90701	4961007	296972

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Uruguay	172656	10558	363971	21927
Other countries	—	—	197160	11741
Transit	115	7	16769	1134
Total	1524169	94244	1424972	112105
Rice. Kilogrs.				
Belgium	145625	13011	137739	11931
Chile	34851	3081	39053	3379
East-Indies	—	—	223129	13490
England	1880925	3626	2458708	216274
France	141292	158234	162002	16196
Germany	91175	15822	387375	33640
Holland	—	—	28946	2514
Italy	1986130	217689	2450620	206725
Spain	—	—	46318	3957
Uruguay	547805	52321	805469	74974
Other countries	23	2	45137	3941
Transit	345763	29672	428735	38651
Total	5173589	493458	7213231	625672
Starch. Kilogrs.				
Paraguay	4036	672	69235	9608
United States	185143	31922	673323	114881
Uruguay	114195	19604	128216	17214
Other countries	16446	2963	21532	2118
Transit	4496	798	31869	4954
Total	324316	55959	924175	148775
Cheese. Kilogrs.				
Belgium	53127	23851	71722	32994
England	36243	23631	69833	39555
France	112698	50437	259307	114717
Holland	19826	10247	18882	14469
Italy	150442	70174	131010	68982
Uruguay	7748	3180	24478	14808
Other countries	2226	1113	4412	1703
Transit	1203	573	1270	595
Total	443513	183206	580914	287823

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
184734	11778	621029	34894	1342390	79157
—	—	25488	2570	222648	14311
—	—	2794	133	19678	1274
1054705	57439	2550397	128334	6554243	392122
70323	6088	102377	10382	456064	41412
39166	3754	13905	1132	126975	11346
26985	2184	651181	55682	901295	71356
2175107	191853	1519347	126774	8034087	690723
72697	7041	16653	1748	392644	38611
492948	40602	151762	12759	1123260	95235
52580	4728	39516	3318	121042	10560
2985378	353783	2171935	248152	9594063	1026349
20671	1696	68944	7584	135933	13237
304678	29478	950456	92657	2608408	249430
177	29	103000	8240	148337	12212
369778	33895	348579	27365	1492855	129583
6610488	675131	6137655	595793	25134963	2390054
43589	5312	10724	1636	127584	17228
659915	88840	317390	55047	1835771	290690
43088	6526	42473	6403	327972	49747
27943	3081	38599	5693	104520	13855
34748	5226	5853	895	76966	11873
809283	108985	415039	69674	2472813	383393
68500	34030	112573	49290	305928	140165
82323	42139	58017	31200	246416	136525
271231	115045	315364	136521	958600	416720
21385	12293	43866	21257	103959	58266
189175	88575	202021	94869	672648	322600
8754	3913	12777	5286	53757	26187
5047	3023	11097	6978	82782	12817
8657	1768	2733	1227	13863	4163
655072	300786	758454	346628	2437953	1118443

WHERE FROM	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Coffee. Kilogrs.				
Bolivia	9200	3200	7584	1148
Brazil	601853	121150	1555341	200580
Chile	16491	5191	13141	4801
England	23396	5363	125003	28261
France	187	96	74359	14767
Holland	—	—	11479	3015
Uruguay	210963	45828	177147	34575
Other countries	7899	2149	23246	4736
Transit	33897	6662	69099	15032
Total	903886	189639	2056399	306915
Tea. Kilogrs.				
Chile	2642	2201	3327	3003
East-Indies	80504	69796	220626	198223
England	43750	38823	48518	42572
Uruguay	15349	5267	5692	5014
Other countries	2433	2291	6100	6571
Transit	611	587	3854	2998
Total	145289	118965	288117	258381
Yerba-Mate of Paraguay. Kilogrs.				
Paraguay	698155	311365	1519825	542184
Uruguay	26338	7899	6427	2316
Other countries	1748	798	6448	2800
Transit	44049	19164	145299	46820
Total	770290	339496	1678039	594120
Yerba-Mate of Brasil. Kilogrs.				
Brazil	6236397	910774	8120124	1044427
Uruguay	2048488	299734	1964782	267683
Other countries	20907	3171	9300	1436
Transit	824673	118252	1659001	260887
Total	9130465	1331961	11753207	1574433
Sugar. Kilogrs.				
Brasil	5035205	808763	6974843	1079287
Chile	543723	88395	458787	74587
Spain	197104	35713	428113	69472
West-Indies	873954	159533	564960	117203

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
6525	3022	5084	1780	28393	9150
785801	170334	1097013	240091	4040008	732155
8449	2848	1252	438	39333	13278
78153	17552	2265	881	228817	52057
15317	3591	1696	662	91559	19116
4830	1738	5486	1872	21795	6625
96703	21457	191115	42594	675928	144454
15362	3451	52163	8723	98670	19059
6856	2329	24636	9869	134488	33892
1017996	226322	1380710	306910	5358991	1029786
3917	3416	2849	2803	12735	11423
146804	141182	81657	65181	529591	474382
134139	130431	103172	101083	329579	312909
7661	7305	33293	29982	61995	47568
6460	6880	5895	5897	20888	21639
121	85	923	1103	5509	4773
299102	289299	227789	206049	960297	872694
1655391	629217	1822006	678664	5695377	2161700
46	18	63101	12853	95952	23086
—	—	—	—	8196	3598
87947	34238	108399	42226	385694	142448
1743384	663473	1993506	733743	6185219	2330832
5326970	909509	4626633	796969	24310124	3661679
1509234	248986	1865445	305619	7387949	1122052
2238	383	34501	6137	66946	11127
1782998	295032	1170643	192974	5437315	867145
8621440	1453910	7697222	1301699	372202334	5662003
7720214	1064392	6790697	926177	26520959	3878619
125309	17007	242401	35073	1370220	215062
614963	70722	375198	50196	2429075	397654
—	—	15574	2161	640791	107346

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Uruguay	2793820	444844	2577161	367994
Other countries	4119	592	37506	6362
Transit	1510447	243584	2309169	382822
Total	10958372	1781424	13439539	2097727
Refined sugar. Kilogrs.				
Belgium	425553	99133	521655	78792
Brazil	13936	2751	27176	5619
Chile	93036	18941	134214	27425
England	928632	166714	475628	118673
France	1187211	257964	4472915	865546
Germany	11770	2459	207403	41226
Holland	3258309	648118	3874361	836960
Italy	3162	671	49736	9146
United States	111280	22854	320149	63034
Uruguay	539074	109206	445549	88402
Other countries	—	—	30019	5904
Transit	671852	136856	719422	135138
Total	7241815	1465667	11278227	2275865
Wine in casks. Litres.				
England	—	16921	98312	17635
France	—	2566460	12321141	3017900
Italy	—	137284	894560	170242
Portugal	—	18747	22016	19152
Spain	—	911853	5625458	1789356
Uruguay	—	331447	2012783	159099
Other countries	—	12077	62127	15369
Transit	—	424561	7343905	471788
Total	—	4419350	28380302	5660541
Wine in bottles. Dozens.				
Belgium	733	6442	520	2373
Brazil	308	2046	702	3760
Chile	399	2235	521	2737
England	13481	49910	10714	49541
France	60721	194711	118358	441419
Germany	153	967	2220	6695
Holland	412	3564	726	3346
Italy	32769	137985	59354	265497

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
2724911	378048	2070482	268715	10166374	1459601
80373	11167	17554	2412	139552	20533
1739070	236115	728825	102224	6376511	964745
13004840	1777451	10240731	1386958	47643482	7043560
220611	40214	313748	65629	1479567	283768
4657	739	22124	3754	67893	12863
67418	12763	43862	8551	338530	67680
353041	64262	302514	54954	2060815	404603
5256193	1016238	3851389	728513	14767708	2868251
211387	41298	45821	8241	476381	93224
3974059	734929	3134668	541378	14241397	2761385
51877	10123	71389	12529	176164	32469
321406	59183	327094	59378	1656279	204449
240934	45980	430722	83896	1079929	327484
—	—	122855	19939	152774	25843
1164882	215607	1228192	236728	3784348	724339
11866465	2241336	9894378	1823490	40280885	7806358
45658	16291	83761	21654	218731	72501
44295980	3431136	33019366	2803502	89636487	11818998
2949319	219397	1365534	121513	5209413	648436
98496	42377	118077	41702	238589	121978
21182023	1521534	24342522	1915947	51159003	6138690
1033342	86437	3899623	324736	6945748	901719
95569	9219	152029	12732	309725	49397
5034940	383289	3296185	265199	15675030	1544837
74735327	5709680	662777097	5506985	169392726	21296556
307	1749	1038	6165	2598	16729
893	3659	162	551	2065	10016
312	1533	338	1475	1570	7980
7171	39229	4285	24876	35651	163554
125080	438717	73381	254044	377540	1328891
959	5248	2390	18379	5722	26789
60	390	359	2300	1157	9590
65005	253412	50917	179495	208045	836389

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Portugal	1772	11749	5682	24776
Spain	1423	6430	4145	14640
Uruguay	6331	26362	11673	41886
Other countries	100	408	203	838
Transit	2916	9896	2538	8911
Total	121518	452705	217356	866419
Bottled-Ale. Dozens.				
Belgium	3263	6335	7069	12683
Chile	2867	5706	1456	2835
England	108286	202805	109858	208309
France	739	1358	2127	4044
Germany	12417	22947	39537	65527
Holland	8061	16357	10009	19672
Uruguay	9084	16528	8395	15520
Other countries	6002	11248	1257	2393
Transit	18533	35558	12860	24672
Total	169252	318842	192568	355655
Spirits in casks. Litres.				
Brazil	1029126	119113	962316	100160
England	18546	2556	4799	1197
France	89724	17742	74810	12976
Germany	557614	67571	459477	49363
Holland	838721	111384	727912	87091
Spain	93271	13655	188116	23163
Uruguay	1137685	135316	1099083	118736
West-Indies	264468	35970	793979	82366
Otner countries	65725	7975	70787	10040
Transit	1378200	160722	1175244	119794
Total	5473080	672004	5556523	604886
Spirits in bottles. Dozens.				
Belgium	8181	11968	3785	5727
Chile	740	3385	667	3605
England	2666	12838	3911	11949
France	79189	357258	146374	665822
Germany	20824	32978	36947	76133
Holland	133176	216145	124336	210408

1873		1874		1871 - 1874	
Quantities	Value.	Quantities.	Value.	Quantities.	Value.
8022	47641	7481	49928	22957	134094
5282	19655	6242	22690	17092	63415
6457	30139	8409	32951	32870	131338
1276	6664	1796	9305	3375	17225
3862	15676	1807	7132	11123	41615
224686	863710	158605	604791	722165	2787625
8868	17670	7544	13826	26744	60414
872	1753	1916	3493	7111	13787
108600	217408	113976	226662	440720	855284
13848	25834	7579	13931	24293	45167
59545	117684	65487	131622	176986	337780
46607	93225	15639	31637	80316	160891
8879	17884	11215	23584	37573	73516
3979	6268	7248	3625	18486	23534
21272	43991	16452	35369	69117	129590
272470	541717	247056	483749	881346	1699963
526872	58730	1060448	106691	3578762	384694
686	260	20730	3911	45061	7924
108410	25764	17911	5772	290855	62254
783719	99789	988360	112465	2789170	329188
1335206	188803	970919	104133	3872758	491411
1240371	133442	1515925	182416	3814743	434194
420025	55596	322498	34081	1023910	126495
385683	46105	833813	90030	3456264	390187
200315	24165	288779	109191	625606	151371
1859951	218375	770832	81977	5184227	580868
6861238	851029	6790215	830667	24681756	2958586
6949	10077	600	976	19515	28748
636	3019	251	1656	2294	11665
4251	22220	4381	19336	15209	66343
138586	595306	110394	468533	474543	2086919
53683	96925	40319	80919	151773	286955
97087	165553	114581	219740	469180	811846

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Uruguay	23191	39447	22796	58157
Other countries	1024	3979	1424	3340
Transit	35589	52318	31764	46229
Total	304580	730316	372004	1081370
Cordials in bottles. Dozens.				
England	19	106	616	23931
France	4625	19299	18678	2705
Germany	3733	11102	8503	82951
Holland	699	3503	1276	5667
Italy	326	972	1007	5096
Uruguay	571	2025	4285	16174
Other countries	391	2311	894	4278
Transit	523	1401	560	1972
Total	10887	40719	35819	142774
Spirit from 25 to 30 degrees, in casks. Litres.				
Belgium	110997	23155	440169	68196
Brazil	—	—	—	—
East-Indies	—	—	433276	59022
England	1442	305	21910	3632
France	352436	28545	400928	64234
Germany	390810	69472	473730	75627
Holland	914236	164021	711788	122153
Spain	115559	19831	301727	44539
United States	28262	5089	59207	9819
Uruguay	150020	26813	240760	57869
Other countries	40006	7015	13090	2050
Transit	53009	9881	350659	57349
Total	2156777	354127	3547244	564490
Olive-Oil, in tins. Kilogrs.				
France	66923	17398	147100	51853
Italy	896149	240212	1114968	330275
Spain	424001	129744	601337	156014
Uruguay	65303	17142	43815	12632
Other countries	6490	2553	11541	3435

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
9094	30575	30719	94114	85800	222293
2739	11049	5144	16906	10331	35274
23011	41907	14990	27906	105354	168360
336036	976631	321379	930086	1333909	3718403
898	4904	928	3246	2461	10961
27702	134258	16830	78899	67835	315407
9275	34858	5928	24482	27439	94373
1601	7740	2759	9012	6335	25922
1274	6094	545	2859	3152	15021
1389	5859	4811	20732	11056	44790
1044	5078	2611	10341	4940	22008
498	1995	895	3790	2476	9158
43681	200786	35307	153361	125694	537640
621618	101931	198259	31632	1371043	224914
156681	17255	4946	513	161627	17768
153424	21944	351734	65864	938434	146830
12889	2536	2531	440	38772	6913
380173	61597	126872	19686	1260409	174062
1013238	177530	492822	76557	3132084	540261
538159	90873	179358	27547	1582057	263519
503130	65693	19064	2646	939480	132709
324559	58103	370270	57198	782298	130209
95781	15762	105920	16879	692481	117323
34845	5034	1376	141	89317	14240
315813	49066	48068	7669	767549	123965
4150310	667324	1901220	306772	11755551	1892713
114205	36966	122379	39523	450607	145740
1848394	529305	1118154	299579	4957765	1399371
1236173	304330	789684	197268	3051195	787356
91462	24186	136551	35599	357131	89559
7971	1934	15562	4033	41564	11955

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Transit	34011	10372	72279	20794
Total.....	1492877	417421	1991040	575003
Olive-Oil, in bottles. Dozens.				
France.....	8248	27589	42396	121004
Italy,.....	5010	15651	3652	10087
Spain.....	581	1814	770	2053
Uruguay.	1486	4345	1184	3148
Other countries.....	904	2949	565	1415
Transit	409	1378	1050	2584
Total.....	16638	53726	49617	140391

OF IMPORTS FREE OF DUTIES,

Printed books.				
Belgium	—	4000	—	4210
Chile	—	3016	—	—
England.....	—	18764	—	23538
France.....	—	19303	—	65218
Germany	—	400	—	4650
Italy.....	—	10170	—	2219
Portugal	—	5160	—	11090
Spain	—	7690	—	3970
United States	—	4616	—	7323
Uruguay	—	9503	—	4652
Other countries.....	—	1320	—	611
Transit.....	—	—	—	1035
Total.....	—	83942	—	128516
Printing Materials, including unsized paper.				
Belgium	—	38364	—	83876
England.....	—	40274	—	53159
France	—	26210	—	60333
Germany	—	5002	—	19721
Holland.....	—	5658	—	1944
United States.....	—	8281	—	725
Uruguay	—	1072	—	976

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
54706	14138	66169	17982	227065	63286
3352911	910859	2248499	593984	9085327	2497267
25923	72137	2580	7022	79147	227852
5001	12153	1845	4509	15508	42400
27	47	—	—	1378	3914
585	1513	1671	3637	4926	12643
992	2422	880	2094	3341	8880
300	738	150	475	1909	5175
32828	89010	7126	17737	106209	300864

THE FOLLOWING MAY BE MENTIONED.

—	8710	—	1740	—	18660
—	4811	—	64	—	7891
—	38244	—	20131	—	100677
—	120346	—	44685	—	249552
—	2469	—	2050	—	7138
—	4610	—	16180	—	35610
—	27250	—	10100	—	53600
—	8307	—	29061	—	49028
—	8046	—	3744	—	23729
—	6367	—	5639	—	26161
—	300	—	100	—	2331
—	24548	—	19625	—	45208
—	254008	—	153119	—	619585
—	90422	—	91734	—	304396
—	84725	—	70193	—	248351
—	88718	—	80119	—	255380
—	30315	—	23860	—	78898
—	3708	—	—	—	28810
—	9139	—	2969	—	27642
—	6555	—	235	—	17628

WHERE FROM.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Other countries	—	717	—	555
Transit	—	—	—	3850
Total	—	125578	—	257957
Railway Materials, including Stone-Coal.				
Belgium	—	275	—	43213
England	—	2892619	—	1177073
France	—	10724	—	12653
Germany	—	1983	—	3000
Holland	—	—	—	27125
United States	—	57717	—	48079
Uruguay	—	7842	—	41583
Other countries	—	13371	—	12577
Transit	—	—	—	34348
Total	—	2984531	—	1399601
Telegraph Materials.				
England	—	239074	—	61349
Other countries	—	3080	—	—
Transit	—	14871	—	510
Total	—	257025	—	61859
Materials for Tramways, or Horse-Railways.				
Brazil	—	81937	—	77328
England	—	824661	—	183896
Uruguay	—	21102	—	32874
United States	—	83296	—	32447
Other countries	—	12854	—	—
Transit	—	—	—	—
Total	—	1023850	—	326545

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	5065	—	2662	—	8999
—	15583	—	5401	—	24864
—	334230	—	277113	—	994938
—	178392	—	—	—	221880
—	251118	—	34752	—	290853
—	1853885	—	2970771	—	8894348
—	9944	—	4364	—	37688
—	101345	—	71706	—	200176
—	25250	—	78984	—	153609
—	193021	—	275451	—	574268
—	23972	—	—	—	49920
—	45896	—	85382	—	165626
—	2682823	—	3521413	—	10188368
—	38009	—	28722	—	367154
—	5715	—	2020	—	10815
—	4200	—	1173	—	20754
—	47924	—	31915	—	398723
—	36743	—	—	—	196008
—	66345	—	43012	—	1117914
—	31839	—	2816	—	88631
—	74715	—	61290	—	251748
—	920	—	1986	—	15760
—	27999	—	—	—	27999
—	238561	—	109104	—	1698060

EXPORTS SUBJECT

DESTINATION.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Bones and Bone-ashes. Kilogrs.				
Belgium	382828	3755	1156008	11387
England	13099647	130496	30529541	304725
France	28934	302	78405	777
United States	794987	7427	66417	654
Uruguay	495155	5000	425353	4188
Other countries	599937	6287	1443449	14217
Transit	631187	5035	564449	5560
Total	16032675	158302	34263622	341508
Shin and thigh bones. Thousands.				
England	2313	16201	4265	29390
Other countries	284	1983	1071	7517
Transit	223	1574	44	313
Total	2820	19758	5380	37220
Horns. Thousands.				
Belgium	462	5085	722	7945
England	865	9550	1073	11749
France	77	852	530	5830
Italy	183	2023	284	3120
United States	14	154	108	1188
Other countries	218	2417	202	2223
Transit	46	509	90	893
Total	1865	20596	3009	32948
Pith of Horns. Thousands.				
England	277	1704	399	3189
Other countries	175	1410	86	685
Transit	—	—	10	80
Total	452	3114	495	3954
Carpincho-skins. Numbers.				
United States	10400	3900	12621	4732
Other countries	4630	1714	4173	1564

TO DUTIES.

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
1154338	12334	1143993	13728	3837167	41204
19557212	197156	15733099	188126	78919499	820503
441631	4398	403320	4836	1744630	22194
1233971	16279	—	—	1152451	10991
291047	2910	480481	5766	1842620	19352
943265	9228	478921	5747	3465572	35479
467272	4682	377079	4516	2039987	19793
24088736	246987	18616893	222719	93001926	969516
3355	23495	1708	11964	11641	81050
956	6717	1089	7631	3400	23848
51	360	43	301	361	2548
4362	30572	2840	19896	15402	107446
403	4435	536	6380	2123	23845
863	9490	349	4128	3150	34917
261	2872	543	6455	1411	16009
367	4067	291	3489	1125	12699
494	5471	53	622	669	7435
266	2533	333	3958	1019	11131
96	1048	98	1165	330	3615
2750	29916	2203	26197	9827	109651
598	4911	248	2004	1522	11808
366	2956	371	2975	998	8026
—	—	19	150	29	230
964	7867	638	5129	2549	20064
10946	4705	24233	9101	58200	22438
1972	739	4410	1654	15185	5671

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Transit.....	384	145	1389	523
Total	15414	5759	18183	6819
Stag-skins. Kilogrs.				
United States.....	3022	1643	9681	6185
Other countries.....	2954	1611	8449	4587
Transit.....	24	13	118	64
Total	6000	3267	18248	10836
Nutria-skins. Kilogrs.				
Belgium	30232	16432	59251	24720
England.....	44647	24265	174911	77846
France	4434	3252	16286	5272
Germany	—	—	15876	6222
Italy.....	3144	1476	3884	2176
United States	178726	96226	165153	65343
Uruguay	64400	34374	43082	16880
Other countries.....	—	—	1891	741
Transit.....	3208	1740	16647	6523
Total	328791	177765	496981	205723
Deer-skins. Kilogrs.				
Belgium	48706	10589	27350	5950
England.....	3127	680	1085	236
France	—	—	10536	2330
Germany	217	47	20858	4498
Other countries	—	—	1976	430
Total	52050	11316	61805	1344
Unwashed Sheep-skins. Kilogrs.				
Belgium	1707566	111149	2070208	42631
England.....	8255833	538786	11305810	129161
France.....	7775151	507077	14393822	166976
Germany	2276	149	244130	3660
Italy	660446	43086	1009603	16911
United States.....	815061	53156	2991657	33077
Uruguay	415196	27439	326325	8249
Other countries.....	145096	9462	266117	3481

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
228	86	4963	1882	6937	2636
13146	5530	33606	12637	80349	30745
1816	982	4457	2417	18976	11227
3002	1624	505	273	14910	8095
86	46	365	197	593	320
4904	2652	5327	2887	34479	19642
37340	10105	40009	10753	166832	62010
90468	25660	10585	2858	320611	130629
16923	4860	1212	328	38225	13712
907	246	—	—	16783	6468
3794	1005	7075	1910	17897	6567
63610	17175	122388	33045	529877	211819
12982	4034	38461	10395	158925	65653
9411	2541	—	—	11302	3282
835	225	10858	2932	31548	11420
235640	65851	230588	62221	1292000	511560
1838	597	905	304	78799	17440
420	137	2312	751	6944	1804
1161	381	1418	354	13115	3065
29973	9653	18005	5852	69053	20050
5595	1662	801	260	8372	2352
38987	12430	23441	7521	176283	44711
3209341	557149	3939356	688836	10926471	1783446
10746832	1854224	5645555	1006063	35954030	4690689
8325244	1381631	11993875	2092928	42488092	5651396
130109	21840	193855	34481	570370	93070
925904	145500	1141482	201925	3737435	559624
769900	133125	17160	3003	4593778	520062
86596	15278	724324	127925	1552441	253134
2405	422	174994	30623	5588612	75324

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Transit.....	176408	10255	431598	103819
Total.....	19953033	1300559	33039270	4145307
Washed Sheep-skins. Kilogrs.				
Belgium.....	15404	1506	712	93
England.....	697994	68282	104551	10259
France.....	7849	768	18393	1802
United States.....	178294	17441	14320	1403
Other countries.....	1932	189	—	—
Total.....	901473	88186	137976	13557
Goat-skins. Kilogrs.				
France.....	838	365	12914	5622
Spain.....	—	—	786	342
United States.....	234075	101774	239014	94824
Other countries.....	1083	472	9203	4082
Transit.....	7164	3114	11729	5106
Total.....	243160	105725	273646	109976
Kid-skins. Kilogrs.				
Belgium.....	23971	18483	26078	21282
England.....	16556	11957	2516	1659
France.....	48347	36341	225100	170616
Uruguay.....	—	—	1621	1325
United States.....	8056	3061	12546	4097
Other countries.....	—	—	1933	1167
Transit.....	120	362	2297	1797
Total.....	97050	70204	272091	201843
Divers skins.				
Total.....	—	1392	—	5657
Jerk-beef, salted. Kilogrs.				
Belgium.....	455	15	321	16
Brazil.....	14058681	462185	17237763	892679
East-Indies.....	11402066	371807	22415283	1115645
England.....	297	10	297737	10476
France.....	1978	65	240059	13308

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
978724	170455	671957	117220	2258687	401749
25175055	4279624	24502558	4303004	102669916	14028494
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
4451	1937	792	345	18995	8269
7871	3424	—	—	8657	3766
264535	112769	226155	99313	963779	408680
5713	2484	33889	14742	49888	21780
1506	655	54248	23598	74647	32473
284076	121269	315084	137998	1115966	474968
8251	6483	4976	4031	63276	50279
1728	1309	—	—	20800	14925
154566	112195	147179	119547	575192	438699
19711	15664	1175	957	22507	17946
3175	1032	—	—	23777	8190
1931	1565	42	34	3906	2766
2021	966	20060	16349	24538	19374
191423	139214	173432	140918	733996	552179
—	2834	—	4360	—	14243
171725	5667	131	5	172632	5704
19711592	661564	12738856	511404	63746892	2527832
19416327	666009	10914222	426646	64147898	2580107
5037	166	4197	167	307268	10819
6118	202	225	9	248380	13564

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Germany	—	—	—	—
Spain	5669458	184875	219547	11947
Uruguay	301990	9847	446129	24281
Other countries	802824	30790	403296	21347
Transit	—	—	399017	21214
Total	32237749	1059594	41659192	2110914
Jerk-beef, dried. Kilogrs.				
Total	48872	2165	113814	5085
Horse-hair. Kilogrs.				
Belgium	369744	144681	661423	278723
England	283753	111036	264514	1891
France	99266	39194	198264	111770
Germany	—	—	4344	79731
Italy	7471	2923	34469	14988
United States	690244	270041	868555	374995
Uruguay	225835	88345	193168	84075
Other countries	3310	1287	1634	707
Transit	51810	20276	53337	23189
Total	1731433	677783	2270708	970069
Dried-Cow-Hides. Numbers.				
Belgium	144955	398627	434939	807369
England	12988	35717	52565	177763
France	41319	113628	163510	501244
Germany	2416	6644	6875	22147
Holland	1000	2750	—	—
Italy	130444	358722	139672	434432
Spain	249172	685253	497655	1568000
United States	738292	2030304	697892	2186837
Uruguay	248195	681574	167364	546299
Other countries	5077	13961	5096	15947
Transit	26807	73809	94335	303276
Total	1600665	4400989	2259903	6563314
Salted-Cow-Hides. Numbers.				
Belgium	146375	585500	211784	729804

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
271400	8956	—	—	271400	8956
254219	8389	671965	26878	6815189	232089
—	—	511499	20498	1259658	54626
632030	20890	65154	2592	1903304	75619
344391	11364	528560	20944	1271968	53522
40812839	1383207	25434809	1009143	140144589	5562858
114978	4946	40088	1726	317752	13922
520563	226742	755291	328510	2317021	978656
340549	148861	237527	103273	1126343	374940
220356	89459	157938	68552	655824	276936
18239	7670	8989	3748	31572	13309
12192	5312	57986	25212	113118	48435
403512	175478	522376	226364	2484687	1146878
102301	45115	278189	120149	799493	337684
1068	465	408	177	6420	2636
73088	30062	50778	22069	229013	95596
1691868	729164	2069482	898054	7763491	3275070
226976	733950	287774	1092912	1094644	3032858
62959	207339	125821	477272	254333	898091
161215	520734	252538	950040	618582	2085646
9037	28371	13415	50977	31743	108139
1175	3818	—	—	1175	6568
180367	582735	186817	703996	637300	2079885
341546	1080167	336299	1254649	1424672	4588069
435856	1332653	644325	2432910	2516365	7982704
120072	375811	280075	1069501	815696	2673185
19152	82649	679	2575	31004	115132
58495	185515	79988	311222	259625	873822
1616840	5133742	2207731	8346054	7685139	24444099
275294	1297114	164971	888757	789424	750843

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
England	401021	1608084	502832	2341025
France	14571	58284	38630	181992
Germany	6000	24000	41414	190547
Holland	2993	11972	1009	4036
Italy	6966	27864	21956	102762
Spain	2600	10400	2400	10950
United States	52415	209660	7069	33578
Uruguay	8404	33616	3824	18164
Other countries	51336	205344	18539	85979
Transit	4824	19296	12398	58891
Total	697505	2794020	861855	4008396
Dried-Calf-skins. Numbers.				
Belgium	999	1499	824	1236
England	534	801	353	530
France	149	223	9392	14088
Germany	168	252	—	—
Italy	12078	18118	19975	29963
Spain	14126	21190	25819	38728
United States	74897	112346	57287	85930
Uruguay	22714	34066	1528	2294
Transit	2310	3467	1849	2775
Total	127975	191962	117027	175544
Salted-Calf-skins. Numbers.				
Total	6593	7684	1382	1382
Unborn-Calf-skins. Kilogrs.				
Belgium	10976	1794	32634	10257
England	688	35	2318	477
France	6227	1707	29746	8320
Germany	—	—	11527	3237
Italy	32792	6374	50064	13662
Spain	19805	5535	15248	4275
United States	1823	513	5452	1526
Uruguay	3239	292	6310	1765
Other countries	—	—	—	—
Transit	—	—	23615	6610
Total	75550	16250	176914	50129

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
500264	2375703	208604	1222962	1612721	7447774
29576	140397	35699	192373	118476	583046
26165	124284	25555	136179	99134	476010
13507	64158	—	—	17509	80166
27890	115378	15726	84595	74538	330599
2502	11884	900	4860	8402	38094
2500	11875	12142	65567	74126	320680
16525	78495	10829	58478	39582	188753
27230	129343	25499	137695	129604	548361
937	4451	35425	190581	53584	273219
922390	4353082	535350	2882047	3017100	14037545
2361	3542	23821	35463	28005	41740
1573	2359	16421	24579	18881	28269
6236	9372	28150	42522	43927	66205
100	150	600	900	868	1302
13736	20478	70677	106276	116466	174835
31923	47887	103689	152663	175557	260468
65292	97945	67548	101629	265024	397850
1380	2075	16250	24082	41872	62517
221	331	5002	7504	9382	14077
122822	184139	332158	495618	699982	1047263
9262	9262	31666	31666	48903	49994
4951	1384	27988	6876	76549	20311
2624	195	3381	351	9011	1058
13964	3395	51858	13705	101795	27127
919	257	—	—	12446	3494
26396	6564	43192	12061	152444	38661
14381	4015	22956	5643	72390	19468
72	20	—	—	7347	2059
886	248	10434	2268	20869	4573
1743	488	—	—	1743	488
15260	4276	10437	2922	49312	13808
81196	20842	170246	43826	503906	131047

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Dried-Horse Hides. Numbers.				
Belgium	5244	5244	10839	14392
Brazil	760	760	1796	2078
England	9227	9227	13582	1059
France	8942	8942	35701	15049
Germany	553	553	869	31919
Italy	12647	12647	3964	4539
Spain	10619	10619	39778	48948
Uruguay	1333	1333	1384	1732
Other countries	690	690	724	849
Transit	4	4	4150	5166
Total	50019	50019	112786	125731
Salted Do. Numbers.				
Belgium	4603	8055	15424	34061
Brazil	—	—	2302	5180
England	36941	5549	40811	90149
France	—	64746	6627	12936
Germany	3171	—	10629	23911
Italy	2553	4468	2408	5417
Spain	—	—	3478	7852
Uruguay	19868	34455	8599	19348
Other countries	—	—	1856	4176
Transit	3239	5669	3589	8075
Total	70375	122942	95723	211105
Clippings of hides. Kilogrs.				
Belgium	534457	29045	856231	47393
England	92865	5024	138449	7491
France	12109	657	37950	2064
Germany	59426	3230	178418	9708
Italy	30106	1637	11824	613
Spain	12727	692	29792	1614
United States	351920	16409	466551	25393
Uruguay	54637	2575	33885	184
Other countries	—	—	—	—
Transit	3397	184	37149	2201
Total	1151644	59453	1790249	98141

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
11994	15482	32256	40315	20333	75433
1504	1888	679	850	4739	5576
7476	9347	14272	22745	44557	56368
8098	10180	41528	52013	94269	103054
1129	1411	5702	10395	8253	13418
7641	9553	4928	6160	29180	32899
19069	26996	36182	45236	105648	131799
1529	1970	4876	6121	9122	11156
1241	1504	1626	2050	4280	5093
2024	2531	665	989	6843	8690
61705	80862	142714	186874	367224	443486
8265	18341	10751	26476	39043	86933
—	—	10	23	2312	5203
55186	125442	31615	70650	164553	350987
10073	22657	6769	15222	23469	50815
12626	28409	34181	76966	60607	134835
788	1772	—	—	5749	11657
—	—	1016	2286	4494	10138
479	1078	3911	8820	32857	63701
300	675	6	13	2162	4864
—	—	24340	54764	31168	68508
87717	193374	112599	255220	366414	787641
720094	39757	641724	74790	3052506	190985
84873	4659	79258	5809	389145	22983
154515	8481	122271	9735	326845	20937
70430	3874	28926	2285	337200	19097
50973	2801	30182	2130	123085	7181
8828	483	7640	611	58987	3400
102929	5659	84692	6581	1006092	54042
13712	839	44963	3566	147197	8824
11935	649	—	—	11935	649
53745	2990	21473	1971	115764	7166
1272034	70192	1354829	107478	5568756	335264

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Hoofs. Kilogrs.				
Total	85571	743	227025	1974
Animal Oils. Kilogrs.				
Belgium	690	120	13329	1828
England	128880	22414	70687	7769
France	46391	8068	95557	11943
Paraguay	—	—	83866	8763
Uruguay	60126	8208	46098	4816
Other countries	181373	19533	10308	1305
Transit	—	—	62651	6546
Total	417460	58343	382496	42970
Ostrich-Feathers. Kilogrs.				
Belgium	597	741	2852	4656
England	2397	2607	8203	12270
France	3535	4045	25407	37152
Spain	603	653	1862	2728
United States	19780	21513	23164	33360
Uruguay	3022	3277	9291	15052
Other countries	531	692	590	964
Transit	712	771	1763	2881
Total	31177	34299	73132	109063
Tallow and Grease. Kilogrs.				
Belgium	6102219	807351	10392940	1435831
Brazil	669563	79021	76445	22707
Chile	1795829	236196	2072014	296626
England	17499514	2338169	24053350	3294006
France	5853903	757301	12202226	1688456
Germany	79926	10425	141571	19538
Holland	39536	5157	192545	26830
Italy	380049	51415	2173229	301702
Paraguay	55737	7209	73276	10048
Spain	111464	14750	274965	43396
United States	13939	1818	—	—
Uruguay	381837	47531	533616	84434
Other countries	1180700	155324	801215	110669
Transit	117086	15273	367870	50688
Total	34281302	4526940	53355262	7384931

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
226358	1821	—	—	538954	4538
6220	893	230	24	20469	2865
43384	4709	—	—	242951	34892
101685	11619	47115	5876	290748	37506
16714	1754	65973	6567	166553	17084
68285	6012	13701	3959	188210	22995
10945	1147	1172	205	203798	22190
—	—	13120	2131	75771	8667
247233	26134	141311	18762	1188500	146209
3976	8713	861	1894	8286	16004
4412	9047	1676	5453	16688	29377
23837	53628	17985	39873	70764	134698
1703	3603	888	1961	5056	9245
28010	60850	18940	41674	89894	157097
4952	10465	14075	30961	31340	59755
949	2310	394	868	2464	4834
1363	2572	4635	10185	8473	16409
69202	151188	59454	132869	232965	427419
6114427	845423	1936308	270036	24545894	3358641
2921	409	5605	668	754534	102805
3149985	446356	3667283	512622	10685111	1491800
19598945	2632188	4861206	652573	66012015	8916916
7702146	1066929	2071068	289435	27829343	3802121
208020	28550	394901	55286	823418	113799
744671	99232	171292	23981	1148044	155200
723060	98686	291099	40753	3567437	492556
136359	16992	117232	15865	382604	50114
192287	26980	61353	8589	640069	93715
206361	28891	184296	24709	404596	55418
49743	5314	873764	112310	1838960	294589
1299914	175260	27576	3709	3309405	444962
117514	16117	444354	60263	1046824	142341
40236353	5487287	15107337	2070799	142980254	19469957

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Washed-Wool. Kilogrs.				
England	16831	1755	12767	2347
United States	14725	1527	502338	104632
Other countries	9615	1002	7112	1299
Transit	—	—	27082	5668
Total	41171	2484	549299	113946
Unwashed-Wool. Kilogrs.				
Belgium	38229146	3989034	49733460	8664587
Chile	54380	5674	276	58
England	7294708	761748	6665156	1174672
France	10836471	1130760	21672448	3820335
Germany	496916	51853	1861300	324424
Holland	361250	37470	217285	34341
Italy	1366214	141533	1297563	224761
Portugal	133306	13910	363912	54319
Spain	—	—	7344	1316
United States	7264168	757802	5101811	953725
Uruguay	4421173	464270	3267466	683917
Other countries	225362	23515	401026	52096
Transit	840715	87725	1287791	249625
Total	71523809	7465294	91876838	16238176
Salted-Tongues. Dozens.				
Total	11133	2043	2292	1717

THE FOLLOWING ARTICLES WERE EXPORTED,

Copper. Kilogrs.				
Chile	486	87	26553	26930
England	612300	330550	348100	166673
Other countries	—	—	10051	4365
Total	612786	330637	384704	197968
Silver in bars. Kilogrs.				
Bolivia	—	—	69	2700
England	—	—	327	12734
Total	—	—	396	15434

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
7487	1797	194	43	37279	5942
—	—	—	—	517063	106159
12614	3025	14715	3276	44056	8602
—	—	2679	590	29761	6258
20101	4822	17588	3909	628159	126961
42754109	10083833	50024467	11212680	181241182	33952134
59004	14161	3804	836	117464	20729
7684392	1798741	4898401	1067162	26542657	4802323
22298663	5183623	15915980	617427	70273562	13722145
759713	182734	1736042	389601	4853871	948612
247592	56998	—	—	826127	128809
2120176	476567	1975208	435235	6759161	1278096
305280	71979	190860	41987	993356	212195
54709	12642	153164	24895	205217	38853
4564541	0364814	3066497	696660	19967037	3444671
1401880	331292	656871	144457	9747090	1623936
186243	44577	59064	10149	870677	120297
1276842	306337	1509106	332056	4905454	975783
83713144	19599968	80189064	17963145	327302855	61268583
11236	8267	4245	2876	28906	14903

VITH MANY OTHERS, FREE OF DUTIES.

—	—	—	—	27039	27017
527228	284241	459527	238143	1947155	1019607
—	—	23497	11999	33548	16364
527228	284241	483024	250142	2007742	1062988
—	—	—	—	69	2700
—	—	53	1213	380	13947
—	—	53	1213	449	16647

DESTINATIONS.	1871		1872	
	Quantities.	Value.	Quantities.	Value.
Silver-Ore. Kilogrs.				
Belgium	—	—	13502	885
Chile	324042	98208	135656	3574
England	—	—	59428	3941
Other countries	—	—	78	51
Total	324042	98208	208664	8404
Other Metals and Ores. Kilogrs.				
Chile	20956	3168	—	—
England	79629	15240	22592	12736
Other countries	13888	2100	—	—
Total	114473	20508	22592	12736
Jackasses. Numbers.				
Bolivia	17433	86970	11016	55217
Other countries	52	156	402	1640
Total	17485	87126	11418	56857
Mules. Numbers.				
Belgium	8673	50228	6350	38100
Chile	5753	100838	6250	118728
Paraguay	305	4574	11	55
Perú	3676	22056	3654	21924
West-Indies	181	995	100	600
Other countries	246	1353	178	1780
Total	18834	180044	16543	181187
Horses. Numbers.				
Bolivia	1498	14980	509	5090
Chile	2143	20506	1202	9900
Paraguay	235	3554	1303	14122
Other countries	414	4140	3765	28927
Total	4290	43180	6779	58039
Cows. Numbers.				
Bolivia	7764	41540	8325	48376
Brazil	12	144	705	4935
Chile	82160	1553628	69312	1175476
Paraguay	2840	14200	51811	222787

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
—	—	146894	110172	160396	119007
33907	9687	7606	1698	501211	145338
177159	124368	76219	56539	312806	220317
—	—	—	—	78	51
211066	134055	230719	168409	974491	484713
—	—	—	—	20956	3168
2000	40	65969	2111	170190	30127
94649	5775	85365	3834	193902	11709
96649	5815	151334	5945	385048	45004
13956	83846	14579	88126	56984	314159
117	732	114	345	685	2873
14073	84578	14693	88471	57669	317032
7015	197704	7892	271928	29930	557960
5013	129364	3579	103165	20595	452095
1233	6235	249	1245	1798	12109
1054	51820	624	27680	9008	123480
390	5500	72	720	743	7815
693	10960	—	—	1117	14093
15398	401583	12416	404738	63191	1167552
1127	13038	1255	13390	4389	46498
683	6369	1760	17004	5788	53779
5709	43214	8092	63415	15339	124305
54	380	1038	4720	5271	38167
7573	63001	12145	98529	30787	262749
7271	120675	5301	104214	28661	314805
803	4924	—	—	1520	10003
72303	1729424	60608	1670783	284383	6129311
34488	263304	46019	460190	135158	960481

DESTINATIONS.	1871		1872	
	Value.	Quantities.	Value.	Quantities.
Perú	165	990	822	4932
Uruguay	778	5050	31443	144103
Other countries	22	92	—	—
Total	93741	1615644	162418	1600609
Sheep. Numbers.				
Bolivia	15515	23272	20222	31781
Other countries	990	1485	3597	6944
Total	16505	24757	23819	38725
Other live, domestic animals.				
Total	2873	3009	357	1039
Lucerne-Hay. Bales.				
Total	1781	10686	—	—
Hay. Bales.				
Total	2295	25245	8340	37482
Barley. Kilogrs.				
Total	4398	123	10464	402
Indian-Corn. Kilogrs.				
Total	108304	4557	71763	2866
Wheat. Kilogrs.				
Total	8946	570	17361	650
Flour. Kilogrs.				
Total	16990	1761	205778	19053
Cheese. Kilogrs.				
Total	2244	644	24758	8238
Beef extract. Kilogrs.				
Total	—	—	—	—
Tanned and raw-furs.				
Total	—	42771	—	296
Tobacco.				
Total	—	79955	—	2897
Timber.				
Total	—	6407	—	8484
Guano. Kilogrs.				
Total	—	—	—	—

1873		1874		1871 - 1874	
Quantities.	Value.	Quantities.	Value.	Quantities.	Value.
1229	14056	1150	11320	3366	31298
2200	8600	12708	67218	47129	224971
12	240	72	1440	106	1772
118306	2141223	125858	2315165	500323	7672641
17065	25266	10247	15332	63049	95651
—	—	6684	9421	11271	17850
17065	25266	16931	24753	74320	113501
28	84	151	455	3409	4587
1010	4040	—	—	2791	14726
10197	42484	?	60749	20832	165960
693000	20260	171061	4260	878923	25045
1653101	62471	3862439	143113	5695607	213007
4955	235	357502	16588	388764	18043
16721	2926	24379	2197	263868	25937
23706	5651	3686	743	54394	15276
6160	52360	—	—	6160	52360
—	8337	—	1012	—	52416
—	50778	—	19356	—	179063
—	17363	—	16823	—	49077
653526	13570	99243	2001	752769	15571

LOADED SAILING-VESSELS WHICH ENTERED DURING
COUNTRIES THEY

WHERE FROM.	1870		1871	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Belgium	17	4411	29	8188
Brazil	145	28878	154	33773
Chile	12	3332	16	5184
East-Indies	297	106775	244	95545
England	4	1850	3	1819
France	201	77434	142	58443
Germany	71	14947	51	14832
Holland	51	11199	41	9985
Italy	57	23893	34	13642
Paraguay	8	504	42	4126
Portugal	3	507	—	—
Spain	189	52108	117	32910
Uruguay	169	73680	106	47696
United States	61	10457	275	25805
West-Indies	29	10087	23	4983
Other countries	9	3484	10	3172
Total	1323	423546	1287	360103

SAILING-VESSELS ENTERED IN BALLAST, IN
COUNTRIES THEY

WHERE FROM.				
Belgium	—	—	—	—
Brazil	3	584	2	427
Chile	—	—	—	—
East-Indies	—	—	—	—
England	—	—	—	—
France	—	—	—	—
Germany	—	—	—	—
Holland	—	—	—	—
Italy	1	981	—	—
Paraguay	—	—	—	—
Spain	—	—	1	190
United States	—	—	—	—
Uruguay	15	4732	8	3568
West-Indies	—	—	—	—
Other countries	—	—	—	—
Total	19	6297	11	4185

THE YEARS 1870-74, CLASSIFIED ACCORDING TO THE SAILED FROM.

1872		1873		1874		1870-1874	
Vess.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
22	6039	21	5224	7	2198	96	26060
210	42774	132	26668	76	16303	717	148396
5	1311	6	1372	16	5601	55	16800
309	103597	243	96957	234	101298	1327	504172
2	1055	3	1341	—	—	12	6065
271	92484	224	93048	117	42464	955	363873
72	17577	77	19431	40	9690	311	76477
47	10996	32	9492	15	4863	186	46535
55	21539	40	16401	21	8037	207	83512
81	8242	15	538	30	1374	176	14784
2	494	—	—	—	—	5	1001
248	75443	162	51892	100	30011	816	242364
191	88719	253	119649	64	24162	783	125888
347	44967	157	21317	268	23342	1108	26705
31	5856	21	5618	1	161	105	353906
79	24067	33	9538	5	818	136	41079
1972	545160	1419	478486	994	270322	6995	2077617

THE YEARS 1870-74, CLASSIFIED ACCORDING TO THE SAILED FROM.

—	—	—	—	—	—	—	—
2	577	—	—	1	195	8	1783
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
11	3357	—	—	53	24902	64	28259
2	562	—	—	—	—	2	562
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	284	—	—	—	—	3	1265
2	130	2	96	—	—	3	226
1	1338	1	538	2	153	8	3051
4	—	—	—	1	985	1	1237
31	6804	20	5614	53	1237	1	153
—	—	—	—	1	10615	127	31333
1	426	2	399	3	330	6	1155
54	13478	25	6647	114	38417	223	69024

LOADED SAILING-VESSELS WHICH LEFT IN THE YEARS

DESTINATIONS.	1870		1871	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Belgium	155	51411	143	54457
Brazil	100	19638	101	22220
Chile	17	7797	25	12131
East-Indies	8	3627	8	3940
England	204	55035	195	55454
France	106	31957	55	21389
Germany	8	1895	5	682
Holland	5	900	2	351
Italy	23	7903	21	5739
Paraguay	13	2462	11	1216
Peru	—	—	—	—
Portugal	—	—	—	—
Spain	26	6597	26	25094
United States	72	30842	86	33621
Uruguay	75	18809	178	6032
West-Indies	92	20552	56	14174
Other countries	59	28992	98	45500
Total	963	288417	1010	302000

SAILING-VESSELS WHICH LEFT IN BALLAST, DURING THE

DESTINATIONS.				
Belgium	1	268	—	—
Brazil	27	6823	8	1845
Chile	13	6340	12	5728
East-Indies	3	1504	5	2535
England	—	—	—	1349
France	—	—	1	937
Germany	—	—	—	—
Italy	19	6875	3	—
Paraguay	—	—	—	—
Peru	—	—	—	—
Spain	5	—	—	—
United States	—	16849	28	8417
Uruguay	60	2315	1	291
West-Indies	—	—	—	—
Other countries	73	32036	44	20366
Total	201	73010	102	41468

1870-74, CLASSIFIED ACCORDING TO DESTINATION.

1872		1873		1874		1870-1874	
Vess.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
103	44724	84	33623	66	25288	551	209503
162	34993	130	28671	100	25678	593	131200
18	8302	25	12482	49	24862	134	65574
9	4434	6	2306	30	14152	61	28459
266	81779	183	59165	97	32618	936	284051
77	34424	62	25277	18	6085	318	119132
18	3840	6	1709	8	2010	45	10136
6	881	5	1115	1	183	19	3430
23	4983	19	5768	8	2559	94	26952
76	7553	22	2083	44	3118	166	16432
—	—	9	5348	—	—	9	5348
1	293	—	—	—	—	1	293
63	16867	24	7076	25	8368	164	44940
67	44322	57	25894	53	25472	335	144859
273	18720	63	13799	109	14894	698	116918
82	29030	74	18720	53	12779	357	84945
218	78054	76	32330	31	12297	482	197173
1462	413199	845	275366	692	210363	4972	1489345

YEARS 1870-74, CLASSIFIED ACCORDING TO DESTINATION.

—	—	—	—	1	573	4	1579
26	6689	36	9236	36	13603	133	841
6	2857	30	16210	50	23976	111	38196
9	3400	48	24142	17	9334	82	55111
4	1637	17	7447	9	4454	30	40915
1	237	1	468	—	—	3	13538
1	350	2	629	1	600	2	1642
3	910	2	918	18	7120	3	30230
1	386	8	13976	—	—	75	1304
10	713	32	276	4	95	22	1084
—	—	16	8572	—	—	16	8572
4	1383	5	1642	—	—	15	5631
3	869	71	35039	18	7061	92	42969
48	13154	85	27467	37	12546	258	78433
94	36722	116	51535	33	16204	360	156863
210	69307	469	197557	224	95566	1206	475908

STEAMERS ENTERED,

WHERE FROM.	1870		1871	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Belgium	3	1334	4	1165
Brazil	4	1634	10	2426
England	59	68159	103	101375
France	33	37208	42	41825
Germany	—	—	3	1066
Italy	18	11810	42	26337
Paraguay	145	37326	120	28178
Spain	1	858	1	294
United States	—	—	3	1190
Uruguay	452	206139	478	200564
West-Indies	—	—	8	4844
Other countries	—	—	—	—
Total	715	364468	814	409264

STEAMERS SAILED, DURING

DESTINATIONS.				
Belgium	3	1334	4	1165
Brazil	4	1634	10	2426
England	59	68159	103	101375
France	33	37208	42	41825
Germany	—	—	3	1066
Italy	18	11810	42	26337
Paraguay	145	37326	120	28178
Spain	1	858	1	294
United States	—	—	3	1190
Uruguay	452	206139	478	200564
West-Indies	—	—	8	4844
Other countries	—	—	—	—
Total	715	364468	814	409264

DURING THE YEARS 1870-74.

1872		1873		1874		1870 - 1874	
Vess.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
25	24471	10	10169	3	5000	45	42139
22	8835	7	1818	5	1310	48	16023
9	11312	15	20594	14	30905	41	63877
114	122642	141	168275	103	145580	520	606031
64	67428	48	64104	39	57542	226	268107
—	—	—	—	—	—	8	4844
30	27962	41	40705	31	35190	162	142004
286	89741	217	73645	115	26781	883	255671
5	4085	2	2386	—	—	9	7623
525	184729	265	83897	589	187687	2309	863016
7	1921	—	—	1	300	11	3411
30	12122	—	—	2	1896	32	14018
1117	555248	746	465593	902	492191	4294	2286764

THE YEARS 1870-74.

25	24471	10	10169	3	5000	45	42139
22	8835	7	1818	5	1310	48	16023
9	11312	15	20594	14	30905	41	63877
114	122642	141	168275	103	145580	520	606031
64	67428	48	64104	39	57542	226	268107
—	—	—	—	—	—	8	4844
30	27962	41	40705	31	35190	162	142004
286	89741	217	73645	115	26781	883	255671
5	4085	2	2386	—	—	9	7623
525	184729	265	83897	589	187687	2309	863016
7	1921	—	—	1	300	11	3411
30	12122	—	—	2	1896	32	14018
1117	555248	746	465593	902	492191	4294	2286764

GENERAL SUMMARY OF NAVIGATION, STEAM AND

ENTERED AND SAILED.	Vessels.	Tonnage.	Vessels.	Tonnage.
American	241	104522	198	83697
Belgian	179	58758	180	64975
Brazilian	284	59191	285	63117
Chilean	42	17469	53	23043
East-Indian	15	6981	16	8294
English	618	298260	645	353749
French	373	183807	282	164419
German	79	16842	62	17646
Hollanders	56	12099	43	10336
Italian	117	56397	139	72055
Paraguayan	311	77618	293	61698
Peruvian	—	—	—	—
Portuguese	3	507	—	—
Spanish	222	62736	147	40011
Uruguayan	1115	462991	1445	464012
West-Indian	140	37514	98	30194
Other countries	141	64514	152	69038
Total	3936	1520206	4038	1526284

a) SAILING-VESSELS ENTERED,

FLAGS.				
Argentine Republic	36	6808	140	11339
Austria	6	1949	6	1778
Belgium	5	1234	6	1918
Brazil	29	6953	49	12108
Denmark	18	3023	15	2424
England	343	126319	271	105088
France	164	64503	126	51833
Germany	153	33148	94	20907
Greece	1	339	—	—
Holland	91	16773	57	12278
Italy	162	67163	139	45569
Norway	54	15665	43	15964
Paraguay	—	—	—	—
Portugal	12	2560	16	3293
Russia	4	2098	4	2212
Spain	142	30801	122	26734
Sweden	22	7107	24	8751
United States	87	42123	72	34806
Uruguay	12	1277	114	7286
Total	1341	429843	1298	364288

SAILING-VESSELS, WITH FOREIGN PORTS—1840-74.

Vess.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
275	122460	381	180582	138	58532	1233	549793
175	99705	125	59185	80	38059	739	320682
444	102703	312	68211	223	58429	1548	351661
29	12470	61	30064	117	56131	302	139177
20	8889	57	27789	54	26448	162	78401
818	435654	725	500119	599	454430	3405	2042212
479	262563	383	247001	213	160633	1730	1018423
109	44391	115	62957	77	74110	442	215946
53	11877	37	10607	16	5046	205	49965
141	83116	143	104497	91	80976	631	397041
740	196120	481	150283	308	58159	2133	543878
—	—	25	13920	—	—	25	13920
3	787	—	—	2	2100	8	3394
329	103201	196	65920	127	39364	1021	311232
1749	478705	855	235991	1645	436771	6802	2078470
116	25486	127	38314	73	20213	554	151721
452	163513	227	93802	72	29649	1044	420506
5932	2151640	4250	1889242	3828	1599050	21984	8686422

ACCORDING TO NATIONALITIES.

165	20703	75	5396	176	17639	592	61885
22	6528	28	10097	4	805	66	21257
4	1403	4	1395	2	572	21	6522
56	10060	27	7525	23	8255	170	44903
7	1995	10	2195	6	2061	56	11698
397	134436	313	129718	237	91234	1561	586795
259	81233	154	65456	93	27447	796	290472
192	43911	164	42758	112	38579	715	179303
7	1841	5	1369	—	—	13	3549
80	16496	73	16878	30	7944	331	70369
282	102678	223	87910	134	45365	940	348685
62	19687	47	15373	18	6330	224	73019
7	868	1	1	1	8	9	877
27	5096	10	2341	8	1539	73	829
228	45137	140	31287	109	24061	741	158020
33	8586	29	10083	12	4049	120	38576
5	1163	5	1387	1	401	19	7261
110	48411	102	51763	55	27825	426	204928
83	8406	34	2201	78	4525	344	37695
2026	558638	1444	485133	1108	308739	7217	2146641

b) SAILING-VESSELS SAILED,

FLAGS.	1870		1871	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Argentine Republic	27	5891	75	9317
Austria	10	3445	2	569
Belgium	4	1308	5	1769
Brazil	18	4377	45	10615
Denmark	19	3344	10	1733
England	257	93677	244	96511
France	140	46647	115	47010
Germany	137	28021	103	21771
Greece	1	339	—	—
Holland	94	16491	59	10847
Italy	139	59629	142	54806
Norway	53	15354	39	13222
Paraguay	—	—	—	—
Portugal	6	1224	10	1774
Russia	7	2035	3	1428
Spain	136	29111	22	7283
Sweden	22	45061	73	34033
United States	89	6739	114	25762
Uruguay	5	734	51	5018
Total	1164	361427	1112	343468

c) STEAMERS ENTERED,

Argentine Republic	198	70493	170	59515
Belgium	2	850	3	510
Brazil	8	2910	18	6469
Denmark	—	—	—	—
England	201	122347	257	160542
France	43	35858	44	38748
Germany	—	—	5	1684
Holland	—	—	—	—
Italy	24	15556	134	79718
Norway	1	184	—	—
Paraguay	—	—	4	756
Portugal	—	—	6	1310
Spain	—	—	8	1917
United States	1	420	15	6104
Uruguay	237	115850	150	51991
Total	715	364468	814	409264

ACCORDING TO NATIONALITIES.

1872		1873		1874		1870 - 1874	
Vess.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
130	15738	44	4889	76	5732	352	41577
17	4804	21	7147	2	562	52	16527
4	1177	4	1438	1	104	18	5796
51	11158	23	5999	31	7847	168	39996
5	1891	7	1513	3	1926	44	10407
368	129919	305	129999	220	90799	1394	540905
169	67525	134	60223	90	38808	648	260123
161	37537	146	39880	103	28787	620	155996
4	837	6	1506	1	278	12	2960
69	13555	82	20859	27	7747	331	69499
221	80224	224	93328	112	48926	838	336913
55	17905	42	14562	13	4716	202	65759
5	730	—	—	—	—	5	730
30	6214	5	1084	7	1420	58	11716
6	1881	5	1130	1	350	22	6824
205	6382	124	9407	18	28435	109	36305
20	40318	27	26847	122	30100	701	152138
89	37841	102	51743	54	6494	407	197113
63	6870	13	1369	35	2888	197	14879
1672	482506	1314	472923	916	305919	6178	1966253

ACCORDING TO NATIONALITIES.

351	138195	269	104714	110	29166	1098	394083
1	937	—	—	—	—	6	2297
43	16802	19	6906	35	8784	123	41871
1	850	—	—	—	—	1	850
344	227443	240	197407	303	239626	1345	68047
87	65241	61	79606	143	93185	378	947365
10	13197	16	21415	15	31751	46	3166
—	—	—	—	2	3166	2	166150
46	28081	26	23026	20	19769	250	312638
—	—	9	—	1	908	2	1092
29	6954	—	150	2	280	36	8140
—	—	1	—	—	—	6	1310
—	—	—	—	—	—	8	1917
12	4051	—	3405	10	4146	47	18126
193	61497	105	28964	261	61410	946	319712
1117	555248	746	465593	902	492191	4294	2286764

d) STEAMERS

FLAGS.	1870		1871	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Argentine Republic	198	70493	170	59515
Belgium	2	850	3	510
Brazil	8	2910	18	6469
Denmark	—	—	—	—
England	201	122347	5	1684
France	43	34858	257	160542
Germany	—	—	44	38748
Holland	—	—	—	—
Italy	24	15556	134	79718
Norway	1	184	15	6104
Paraguay	—	—	—	—
Portugal	—	—	4	756
Spain	—	—	6	1310
United States	1	420	8	1917
Uruguayan	237	115850	150	51991
Total	715	364468	814	409264

GENERAL SUMMARY OF THE VESSELS OF BOTH KINDS,

Argentine Republic	459	153685	555	139686
Austria	16	7403	8	2347
Belgium	13	4242	17	4707
Brazil	63	17150	130	35661
Denmark	37	6367	25	4157
England	1002	465381	1029	522863
France	390	182866	329	176339
Germany	291	61169	207	46046
Greece	2	678	—	—
Holland	185	33264	116	23125
Italy	349	157904	549	259811
Norway	109	31387	82	29186
Paraguay	—	—	8	1512
Portugal	18	3784	38	7687
Russia	11	4133	7	3640
Spain	278	59912	252	56330
Sweden	44	13846	46	16034
United States	178	86024	175	81047
Uruguay	491	231711	465	116286
Total	3936	1520206	4038	1526284

SAILED.

1872		1873		1874		1870-1874	
...ess.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
351	130195	269	104714	110	29166	1098	394083
1	937	—	—	—	—	6	2297
43	16802	19	6906	35	8784	123	41871
1	850	—	—	—	—	1	850
344	227443	240	197407	303	239626	1345	947365
87	65241	61	79606	143	93185	378	312638
10	13197	16	21415	15	31751	46	68047
—	—	—	—	2	3166	2	3166
46	28081	26	23026	20	19769	250	166150
—	—	—	—	1	908	2	1092
29	6954	1	150	2	280	36	8140
—	—	—	—	—	—	6	1310
—	—	—	—	—	—	8	1917
12	4051	9	3405	10	4146	47	18126
193	61497	105	28964	261	61410	946	319712
117	555248	746	465593	902	492191	4294	2286764

ENTERED AND SAILED ACCORDING THE FLAGS.

997	296831	657	219713	472	81703	3140	891681
39	11332	49	17244	6	1367	118	39693
10	4454	8	2833	3	776	51	17002
193	54822	88	27336	133	33670	607	163639
14	5586	17	3708	9	3987	102	23805
453	719241	1098	654531	1063	661285	5645	3023301
602	279240	410	284891	469	252625	2200	1175961
373	107842	342	125468	245	130868	1458	471493
11	2678	11	2875	1	287	25	6518
149	30051	155	37737	61	22023	666	146200
595	239064	499	227290	286	133829	2278	1017898
117	37592	89	29935	33	12862	430	140962
70	15506	3	301	3	568	86	17887
57	11310	15	3425	15	2959	143	29165
11	3044	10	2517	2	751	41	14085
433	85455	264	58134	231	54162	1458	313993
53	14968	56	19490	30	10543	229	74881
223	94354	222	110316	129	64552	927	436293
532	138270	257	61498	635	130233	2380	675265
932	2141640	4250	1889242	3828	1599050	21984	8686422

Mapa fitogeografico
de la
REPÚBLICA ARGENTINA

Limites politicos

Formacion paraguaya

„ subtropica

„ de las Pampas

„ Mesopotamica

„ del Chaco

„ del Monte

„ Patagonica

„ de la Puna

Region de los montes antarcticos

„ transitoria de Chile

„ de los Andes tropicos

COMITÉ CENTRAL ARGENTINO
Esposicion de Filadelfia.

Litogr. de Alb. Larsch, Florida 177 Buenos Aires.

Carta topografica

DE LA PAMPA Y DE LA LINEA DE DEFENSA

(actual y proyectada)

CONTRA LOS INDIOS.

Construida por orden del Exmo Señor Ministro de Guerra y Marina, Coronel Dr Dn Adolfo Alsina, segun los mejores materiales y trabajos propios

por

Diciembre 1875. el Sto Mayor Dn F.L.Melchert.

COMITE CENTRAL ARGENTINO

para la

EXPOSICION DE FILADELFIA.

Escala: 1 : 2,600,000

0 10 20 40 60 80 100 150 Kilometros.

0 1 2 3 4 5 10 15 20 25 30 Leguas de 6000 Vs

ESPLICACIONES

- Linea de frontera actual.
- Linea nueva proyectada.
- Comandancia de seccion.
- Fuerte. Fortin.
- Postas Militares.
- Toldos de Indios sometidos.
- Ferro-Carril en esplotacion.
- id. id. en construccion.
- id. id. proyectado (estudios preliminares hechos).
- Carretera.
- Caminos internarios de esploraciones y espediciones.
- Lagunas de agua potable.
- id. de agua salada.
- Salina.
- Jaguel o pozo.
- Medano.- Lomada.
- Cañadones. Terreno bajo con buenos pastos, inundado en la estacion de lluvia.

Litogr. de ALBERTO LARSCH, Florida 164, Buenos Aires.

Grabado por Curt Stiller.

Mapa fitogeografico

de la parte Norueste de la

REPÚBLICA ARGENTINA

Chaco

Salinas

Montes subtropicos

Pastos alpinos

Aliso y Queñoa

Monte del Este

Pino

Montes serranos

Parque

Arbustos alpinos

Cebil

Montes del Oeste

Quebracho colorado

Puna

Montes subtropicos

Parque

Region del Monte

COMITÉ CENTRAL ARGENTINO

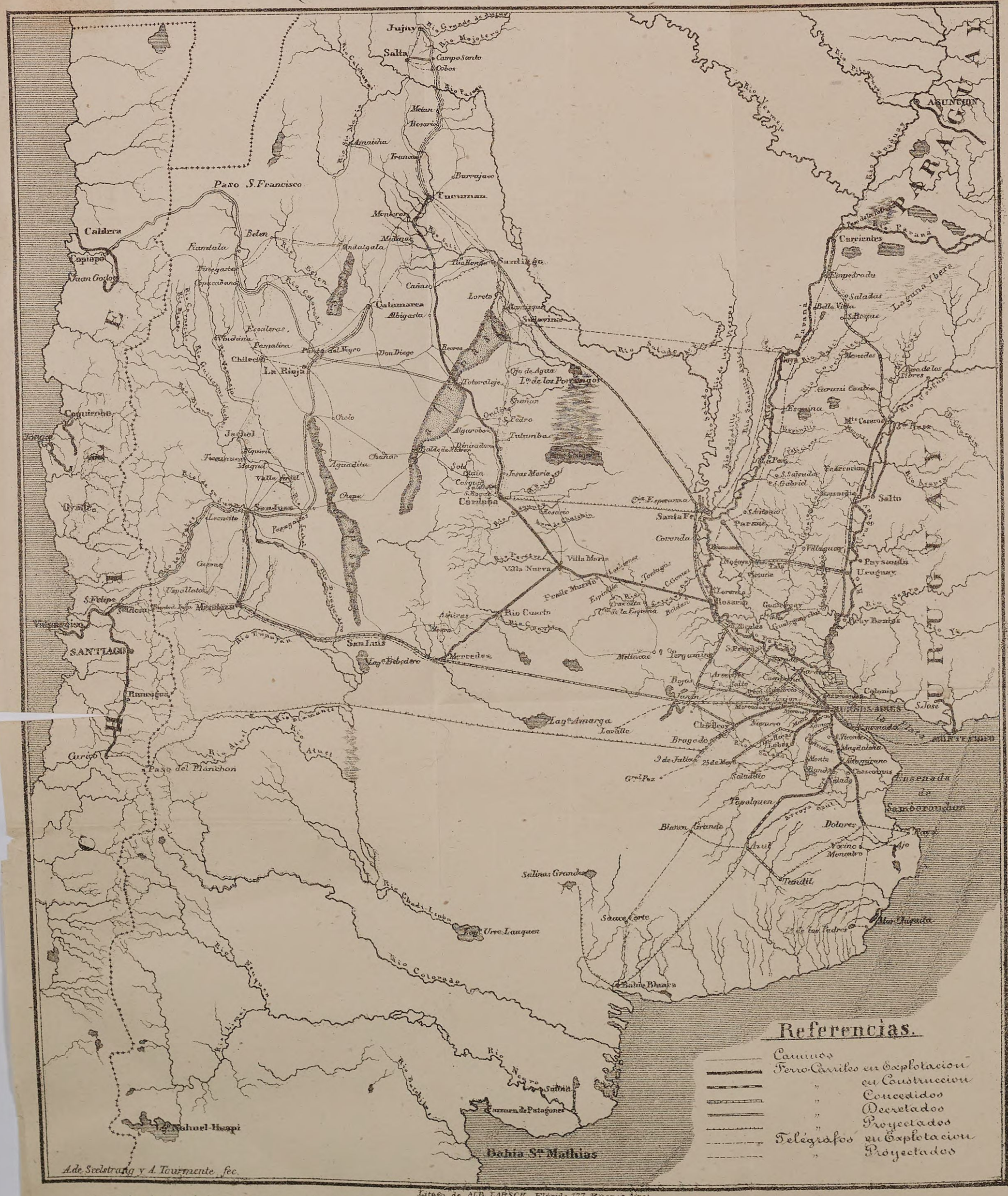
Esposicion de Filadelfia.

Litogr. de Alb. Larsch, Florida 164, Bs Aires

VIAS TERRESTRES DE COMUNICACION

DE LA

REPÚBLICA ARGENTINA.



A. de Seelstrang y A. Tourmente fec.

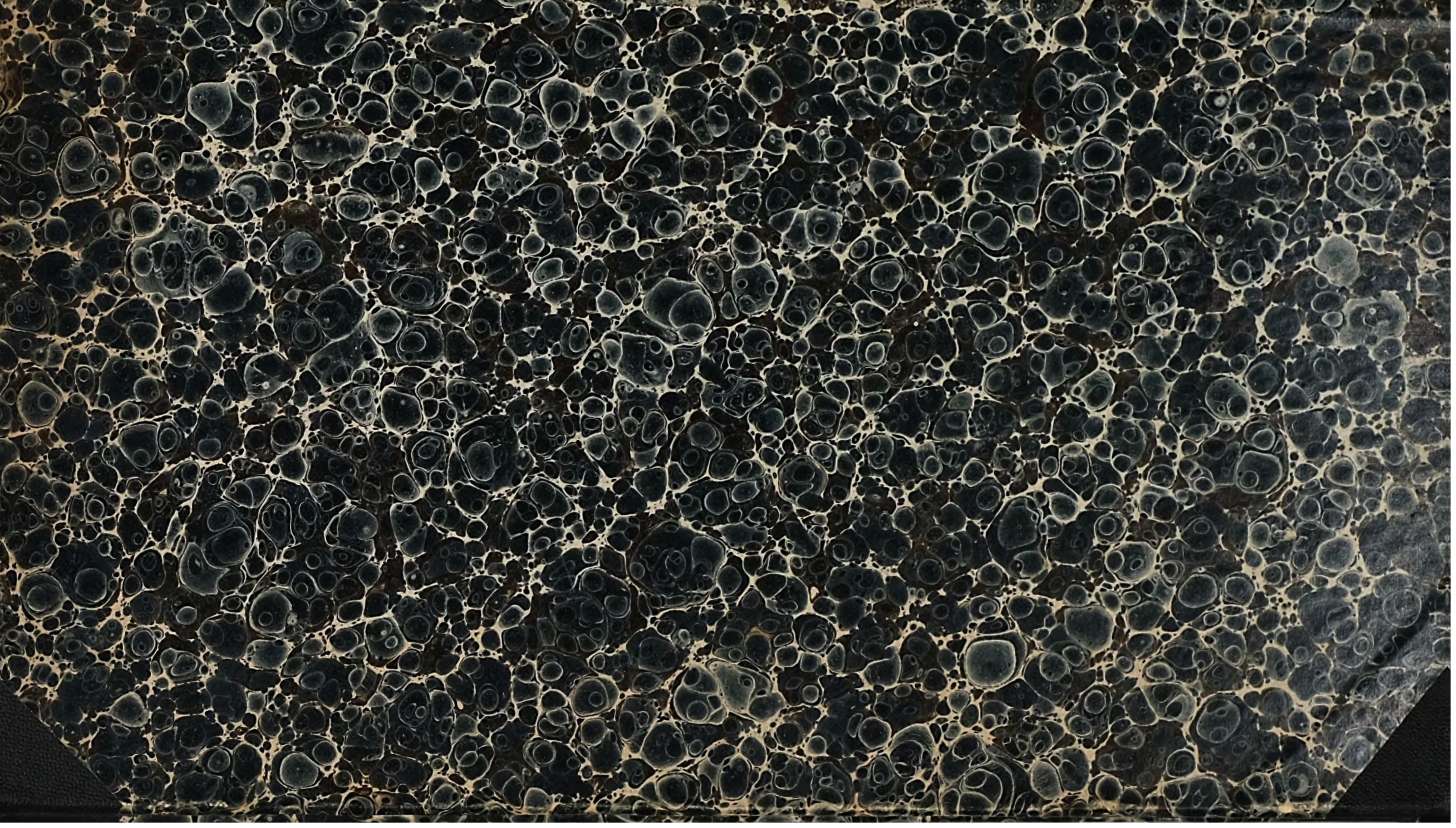
Litog.ª de ALB. LARSCH, Florida 177 Buenos Aires.

COMITE CENTRAL ARGENTINO

Esposicion de Filadelfia.

BUENOS AIRES

Setiembre 1875.



BSB Bayerische StaatsBibliothek

MDZ Münchener DigitalisierungsZentrum Digitale Bibliothek

Napp, Richard

The Argentine Republic written in German by Richard Napp assisted by several fellow-writers for the Central Argentine Commission on the centenary exhibition at Philadelphia (With several Maps)

Buenos Aires 1876

Bamberg, Staatsbibliothek -- Geogr.o.380-a
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